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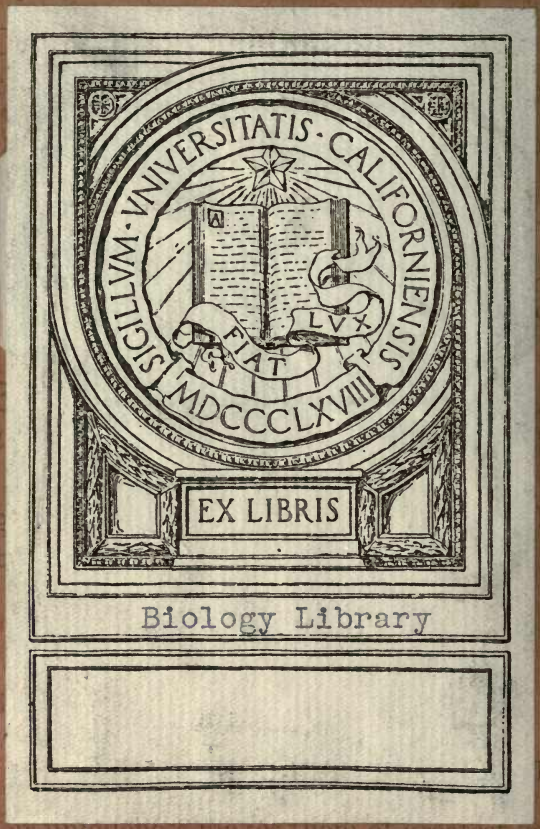

Hough's American Woods.

Part III.

THE

AMERICAN WOODS,

EXHIBITED BY ACTUAL SPECIMENS

AND WITH COPIOUS EXPLANATORY TEXT,

BY

ROMEYN B. HOUGH, B. A.

PART III.

REPRESENTING TWENTY-FIVE SPECIES

BY

TWENTY-SIX SETS OF SECTIONS.

LOWVILLE, N. Y., U. S. A.
PUBLISHED AND SECTIONS PREPARED BY THE AUTHOR.
1892.

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By ROMEYN B. HOUGH.

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ALBANY, N. Y.

TO

MY MOTHER

AS A PARTIAL COMPENSATION FOR THE HOURS OF ANXIETY OCCASIONED HER, WHILE IN BOY-HOOD QUEST AFTER BIRD OR FLOWER, THIS VOLUME IS MOST DEVOTEDLY DEDICATED.

743124

PREFACE TO THE SERIES.

The necessity of more generally diffused information concerning the variety and importance of our forest trees is justification enough for the appearance of this work, especially at this day, when the demands of Forestry in this country are constantly more and more keenly felt. The work was undertaken at the suggestion of my father, whose intense interest in Forestry, and a kindred taste, at once gave me inspiration to the work. It was entered upon with the expectation of his valuable companionship and counsel during its progress, but, alas ! that I was destined to have only at the outset, and, while I was then left ever to mourn the loss of a kind father, companion and teacher, the reader must fail to find in these pages that value and finish which his mind would have given them.

Among the happiest pictures of my memory are those in which I see my father's delight, as I would show to him, from time to time, my successful progress in devising a way of making the sections for this work, and if only for the happiness which its appearance would have caused him, could he have lived until this day, I have felt duty-bound to go on with it, even though left to do it alone.

The work is the outgrowth of one, of somewhat similar plan, proposed by my father some years since, but which he did not carry into effect. Its design is primarily and principally to show, in as compact and perfect a manner as possible, authentic specimens of our American woods, both native and introduced. For that end three sections, respectively transverse, radial and tangential to the grain (see Glossary), are made of each timber, sufficiently thin to allow in a measure the transmission of light, and securely mounted in well made frames.

The three planes above mentioned show the grain from all sides, so to speak, no plane being possible but that would be either one of them or a combination of them. The difficulty, however, of cutting a great number of sections exactly on those planes is obvious, so let it be understood that the terms, "transverse," "radial" and "tangential," are, in many cases, only approximately exact in their application.

My endeavor is to show, either in a part or all of the sections standing to represent a species, both the heart and sap-wood, but with some woods

as the Sumach, for instance, where usually only the outermost ring, or a part of it, could be said to represent the sap-wood, the display of that is quite impossible. In certain other woods, as the Spruce, etc., the transition from sap to heart-wood is almost indistinguishable by any difference in color, and, although both may be shown in the sections, one can scarcely distinguish between them.

The sequence of the numbers given to the various species is of importance only to show the botanical arrangement within a given Part, each Part being independent of the others.

The text of this work has been added rather as a secondary matter, to supply to those not having it in other form, such information as is of importance, in connection with the wood specimens, to give a fairly good acquaintance with the trees represented. It contains little, if any thing, new to the botanist, but to others it is hoped it may be of some value.

In its preparation some use has been made of my father's Elements of Forestry, and thanks are due the publishers of that work — Messrs. Robert Clarke & Co. of Cincinnati, Ohio — for the use of cuts in reproducing a number of its illustrations. Other valuable books of reference have been the works of Drs. Gray, Wood and Bessey, LeMaout and Decaisne's Descriptive and Analytical Botany, Prof. C. S. Sargent's Report on the Forest Trees of North America (constituting Vol. IX, Ninth Census of the United States, 1880), Micheaux and Nuttall's North American Sylva, George B. Emerson's Trees and Shrubs of Massachusetts, D. J. Browne's Trees of America, etc.

The authenticity of the timbers represented in this work has been a subject of personal attention and special care on the part of the author. The trees selected for specimens have been identified in the field, before felling, while the leaves, flowers or fruit (one or more) have been obtainable, and he can, hence, vouch for the authenticity of every specimen represented.

Succeeding parts, uniform in style with Part I, and representing in each case twenty-five additional species, are planned to appear later, with the ultimate end in view, of representing, as nearly as possible, all of the American woods, or at least the most important, in such a series of volumes as this one.

Upon the reception which this meets in public favor, and upon the co-operation of those interested in the cause, must naturally depend the carrying out of that plan. It is hoped that greater experience and skill will enable us to obviate in future parts the faults which occur, from lack of those qualities, in this.

Notice of errors in this work will be thankfully received in hopes of profiting therefrom in the future.

LOWVILLE, N. Y., *March* 30, 1888.

PREFACE TO PART III.

We are pleased to be able to announce the completion of Part III, *American Woods*, though delayed, by unforeseen circumstances, longer than expected at the time of the completion of Part II.

In its preparation I have to acknowledge the kind service rendered by Rev. J. Hermann Wibbe, Mrs. Elizabeth G. Britton and Dr. Charles Mohr in determining the German, French and Spanish synonyms. For courtesies, while in the field gathering timbers, I am pleased to express gratitude to Prof. W. R. Dudley, Prof. N. L. Britton, Mr. Henry Hicks and others.

Were I to express thanks to all, by name, towards whom I feel them, it would necessitate an enumeration of all my patrons. Each does his part to help the cause along and to each in turn we feel correspondingly grateful.

The present agitation in botanical nomenclature, which is very justly designed to establish system and order out of the hitherto unsettled state, finds me in a dilemma. The new system demands, by the law of priority, that many names in common use must be replaced by others. But, should I adopt many of these more recently approved names at this time, it would destroy conformity with the preceding parts of the series, and with the Manuals of Botany now in general use, which I cannot do. I am compelled, therefore, for the present to adopt generally the names which are in more common use, but have introduced in foot-notes the more recently approved names, if well established.

I have endeavored to keep Part III up to the standard of its predecessors, and hope that it will merit the pleasing reception and approbation so generously awarded them. It shall be our constant aim to maintain that standard, and feeling confident of being able to bring out the subsequent parts of the series with dispatch, we hope to deserve the continued interes and favor of our patrons.

By way of encouragement to those who may be impatient to receive the future parts, we are pleased to say that Part IV is already well along and is to appear at an early date.

LOWVILLE, N. Y., *October* 6, 1892.

A KEY, BASED MAINLY UPON THE FLOWERS,

Designed as an Aid in the Identification of the Species represented in Parts I, II and III.

---

a. **Angiospermæ** — seeds in a closed ovary.
b. *Polypetalous* — petals present and distinct.
c. Stamens numerous, more than 10, and
d. Calyx inferior — wholly free from the pistil or pistils.
e. Pistils numerous and cohering in a cone-like mass. (*Magnoliaciæ*.)
f. Anthers opening inward; leaves folded lengthwise in the bud (*Magnolia*), pointed at both ends and
Thick, glaucous beneath ....51. M. GLAUCA.
Thin, green beneath..... ... ...1. M. ACUMINATA.
f^2. Anthers opening outward and leaves folded crosswise in the bud. 2. LIRIODENDRON TULIPIFERA.
e^2. Pistil solitary and
f. One-celled, style single, flowers perfect, stone of drupe horny (*Prunus*), turgid ovate, marginless; flowers in
Racemes terminal..... .....29. P. SEROTINA.
Corymbose umbels..... .....55. P. PENNSYLVANICUM.
Umbels..... ....56. P. AVIUM.
f^2. Compound as shown by the styles and cells of ovary; calyx valvate in the bud, deciduous (*Tiliaceæ*); stamens somewhat polydelphous (*Tilia*) and with 5 petal-like scales opposite the petals ...3. T. AMERICANA.
d^2. Calyx superior — adnate — to the ovary which is
e. 2–5-celled and fruit a
f. Pome with 2–5 papery cartilaginous carpels (*Pyrus*)
Styles united below..... .....30. P. MALUS.
Styles distinct ....57. P. COMMUNIS.
f^2. Pome drupe-like with 1–5 bony seeds .....58. CRATÆGUS PUNCTATA.
e^2. Ovary 10-celled.....59. AMELANCHIER CANADENSIS.
c^2. Stamens few, not more than 10, alternate with the petals when of the same number.
d. Calyx inferior — free from the ovary.
e. Ovaries 2–5, separate; stamens distinct and inserted on the receptacle; trees with pinnately compound and uniformly opaque leaves. 4. AILANTHUS GLANDULOSUS.
e^2. Ovary single, but compound as shown by the cells, styles or stigmas.
f. One-celled and one-seeded; styles or stigmas three; shrubs or trees with regular flowers (*Anacardiaceæ*); leaves compound with 11–31 oblong lanceolate acuminate leaflets; common petiole densely villous and not winged; flowers in terminal thyrses.....5. RHUS TYPHINA.
f^2. Two-several celled and flowers
Irregular (*Aesculus*)..... .....6. AE. HIPPOCASTANUM.
Regular, stamens as many as the petals; trees with pinnately-veined leaves; calyx minute; fruit berry-like .....52. ILEX OPACA.
e^3. Ovary single and simple with one parietal placenta; corolla subregular (not papilionaceous) and imbricated in aestivation.
f. Flowers diœcious; stamens 10; tree unarmed. 27. GYMNOCLADUS CANADENSIS.
f^2. Flowers polygamous; stamens 5; tree armed with thorns (*Gleditschia*) which are triple and pods linear..... .....28. G. TRIACANTHOS.

*d*². Calyx superior — adnate to the ovary; flowers in umbels; stamens 5; styles 5; fruit drupe-like with 5 cells each with a single ovule (*Aralia*); arborescent and armed with prickles .....8. ARALIA SPINOSA.

*b*². *Gamopetalous* — petals present and united; stamens 2–4-times as many the lobes of the corolla, inserted on its base and filaments distinct (*Ebenaceæ*). 61. DIOSPYROS VIRGINIANA.

*b*³. *Apetalous* — without petals.

c. Flowers not in catkins; pistil one, simple or compound, and the cells of the ovary containing 1–2 seeds each.

d. Ovary inferior — adnate its whole length to the calyx-tube — 1-celled and 1-seeded; style 1, stigmatic down the side (*Nyssa*); fertile peduncle bearing each two or more flowers .....9. N. MULTIFLORA.

*d*². Ovary superior — free from the calyx.

e. Stipules sheathing the stem; trees with naked monœcious flowers arranged in heads .....13. PLATANUS OCCIDENTALIS.

*e*². Stipules not sheathing the stem or none.

f. Ovules a pair in each cell of the ovary which becomes in

g. Fruit a double samara (*Acer*).

h. Leaves simple and palmately veined; flowers appearing

i. With the leaves in pendulous corymbs.....7. A. SACCHARINUM.

*i*². Before the leaves in short umbels, and

Apetalous; young fruit wooly..... 26. A. DASYCARPUM.

Petals present, linear-oblong, fruit smooth....53. A. RUBRUM.

*h*². Leaves compound .....54. A. NEGUNDO.

*g*². Fruit a 1-celled and 1-seeded samara (*Fraxinus*).

h. Samara terete at base; leaflets petiolate

New growth smooth .....10. F. AMERICANA.

New growth pubescent..... 31. F. PUBESCENS.

*h*². Samara broad at base ..... 62. F. SAMBUCIFOLIA.

*f*². Ovules single in each of the 1 or 2 cells of the ovary.

g. Anthers opening by uplifted valves; stigma single and entire; flowers diœcious; stamens 9; anthers 4-celled; involucre none; fruit an ovoid, blue drupe with reddish pedicel..32. SASSAFRAS OFFICINALE.

*g*². Anthers extrorse; stigma 2-cleft; fruit a 1-celled samara winged all round (*Ulmus*).

h. Flowers nearly sessile; samara not fringed; ciliate; leaves very rough above ..... 11. U. FULVA.

*h*². Flowers on drooping pedicels; samara ciliate-fringed; leaves smooth.

Bud-scales glabrous; flowers fascicled; branches not corky-winged .....33. U. AMERICANA.

Bud scales downy-ciliate; flowers racemed; branches corky-winged.....34. U. RACEMOSA.

*g*³. Anthers introrse; fruit a dark-purple drupe; leaves long-taper-pointed ..... 12. CELTIS OCCIDENTALIS.

*c*². Flowers diclinous and one or both sorts in catkins.

d. Only one sort (the staminate flowers) in catkins.

e. Fertile flowers single or clustered; fruit naked; leaves pinnately compound (*Juglandaceæ*).

f. Corolla present in the fertile flowers; fruit with valveless epicarp (*Juglans*).

g. Fruit ovate, oblong and viscid-hairy .....14. J. CINEREA.

*g*². Fruit globose, roughly dotted (not viscid-hairy).....35. J. NIGRA.

*f*². Corolla not present in the fertile flower; fruit with usually 4-valved epicarp (*Carya*) which is

g. Thick; valves separating to base; bark in loose plates;

Leaflets 5; nut small.....36. C. ALBA.

Leaflets 7–9; nut large..... 64. C. SULCATA.

*g*². Thin; valves not freely separating to base; bark close; nut quite smooth and

Thick-shelled; kernel moderately bitter; leaflets 5–9. 65. CARYA PORCINA.

Very thin-shelled; kernel very bitter; leaflets 7–9. 37. CARYA AMARA.

e^2. Fertile flowers 1–3 together, invested wholly or partly with an involucral covering; leaves simple (*Cupuliferæ*).

f. Involucre valveless, cup-like, composed of many scales and only partly inclosing the one nut, *i. e.*, acorn (*Quercus*).

g. Leaves with teeth and lobes obtuse or rounded (not bristle-pointed); acorns maturing first year (and hence on new wood) and leaves

Oblong, sinnate-pinnatifid, nut ⅓ immersed in the tubercled cup. 38. Q. ALBA.

Lyrate pinnatifid, nut ½ or more immersed....39. Q. MACROCARPA.

Obovate, sinnate-crenate, nut ½ immersed, peduncles longer than petioles.. ... .66. Q. BICOLOR.

Oblong, undulately crenate-toothed, peduncles shorter than petioles..... ...67. Q. PRINUS.

Lanceolate-oblong, sharply undulate-toothed; acorns small. 68. Q. MUHLENBERGII.

g^2. Leaves with teeth and lobes acute and bristle-pointed; acorns maturing the second year (and hence on old wood); leaves

Moderately pinnatifid; cup very shallow and saucer-shaped; scales fine.....15. Q. RUBRA.

Deeply pinnatifid; cup top-shaped; scales rather coarse; nut half immersed .....69. Q. COCCINEA.

f^2. Involucre 2-4-valved, becoming hard and prickly and inclosing 1-3 sweet, edible, flattened, subglobose nuts; sterile flowers in catkins. 40. CASTANEA VESCA.

f^3. Involucre 4-valved and inclosing two 3-cornered, edible nuts. 16. FAGUS FERRUGINEA.

e^3. Fertile flowers in short catkins; nuts small and achenium-like; sterile flowers destitute of calyx; leaves simple.

f. Nutlet inclosed in a bladder-like bag .....41. OSTRYA VIRGINICA.

f^2. Nutlet not inclosed but subtended by an enlarged leafy bract. 42. CARPINUS CAROLINIANA.

d^2. Both staminate and pistillate flowers in catkins.

e. Ovary and pod 2-celled, many-seeded. 60. LIQUIDAMBAR STYRACIFLUA.

e^2. Ovary 1-2 celled with a single ovule in each cell;

f. Calyx scale-like or none; stigmas 2, filamentous; fertile flowers arranged 2 or 3 together under each scale of the cone-like catkin (*Betula*); bark

g. Brown and close, catkins erect.....44. B. LENTA.

g^2. Yellowish-gray and ragged, catkins sub-erect .....17. B. LUTEA.

g^3. White, and leaves.

Deltoid, smooth both sides. .... 70. B. POPULIFOLIA.

Ovate, hairy on veins beneath..... .....43. B. PAPYRACEA.

f^2. Calyx regular and succulent in fruit... .....63. MONUS RUBRA.

e^3. Ovary 1-celled and many-seeded, the seeds at maturity furnished with a hairy tuft (*Salicaceæ*).

f. Bracts of the catkins entire; calyx wanting; stamens 2-7 (*Salix*); catkins on leafy branchlets with yellowish, deciduous scales; capsules glabrous; stamens 3-5; petioles

g. Glandular; scales of catkin entire; leaves

Narrow-lanceolate; fruiting catkins rather dense....45. S. NIGRA.

Lanceolate or ovate lanceolate, glaucous beneath, fruiting catkins very loose.....71. S. AMYGDALOIDES.

g^2. Not glandular; scales dentate ....46. S. ALBA.

f^2. Bracts of the catkins lacerately fringed; calyx a disk-like cup; stamens 8-30, leaves broad (*Populus*); styles with

g. Narrow lobes; capsule small; seeds minute, petioles laterally compressed; leaves

Cordate-orbicular, finely serrate.....72. P. TREMULOIDES.

Ovate-orbicular, coarsely dentate .....18. P. GRANDIDENTATA.

Deltoid; branchlets terete..... ..... 73. P. DILATATA.

g^2. Broad lobes; capsules large; seeds 1 line or more in length and leaves

Ovate, reticulated and whitish beneath....47. P. BALSAMIFERA.

Broadly deltoid; branchlets angled.....48. P. MONILIFERA.

a^2. **Gymnospermæ** — seeds naked, borne superficially on carpellary scales. Cone-bearing (*Coniferæ*).

b. Scales of cone many, each in the axil of a bract and bearing 2 inverted ovules; seeds winged.

c. Leaves evergreen, fascicled; cones maturing the second year (*Pinus*).

d. Leaves in 2s with long sheaths; cones about half as long as the leaves and with scales thickened at the end and unarmed....19. P. RESINOSA.
Armed with a small weak prickle ....75. P. MITIS.

d^2. Leaves in 3s with short sheaths; cone about half as long as the leaves and with scales thickened at the apex and armed with a reflexed spine.
49. P. RIGIDA.

d^3. Leaves in 5s with very short sheaths; cones longer than the leaves and with scales not thickened at the ends, unarmed..... ..50. P. STROBUS.

c^2. Leaves evergreen, scattered (not fascicled); cones with thin scales, maturing the first year (*Abies*).

d. Cones erect, cylindrical, large (3-4 in.) and with conspicuous bracts; leaves flat, linear ....22. A. BALSAMEA.

d^2. Cones pendant and bracts inconspicuous.

e. Small, 8 lines or less, scales entire at tip, leaves linear.
21. A. CANADENSIS.

e^2. Larger, 1–1½ in., scales eroded at tip; leaves 4-angled.....20. A. NIGRA.

c^3. Leaves deciduous, soft, needle-shaped and in fascicles of many each; cones about 8 lines in length, scales thin (*Larix*) and with inflected margins.
23. L. AMERICANA.

b^2. Scales of cone few, without bracts and each bearing 2–8 erect ovules.

c. Flowers monœcious; scales of cone,
Imbricated and 8–12 in number (*Thuja*) .....24. T. OCCIDENTALIS.
Pelteta, edges joined and about 6 in number (*Chamaecyparis*).
74. C. THYOIDES.

c^2. Flowers diœcious; scales fleshy and consolidated, making a small, dark blue berry-like fruit; leaves scale-like and imbricated in 4 rows.
25. JUNIPERUS VIRGINIANA.

A KEY, BASED UPON THE LEAVES,

Designed as an Aid in Identifying the Species represented in Parts I, II and III when out of Season for procuring the flowers.

N. B.— As this key applies only to the species thus far represented in AMERICAN WOODS it is important always to confirm identification by applying the more detailed description given in its proper place.

a. **Deciduous Leaves** — falling in autumn.
b. *Simple Leaves.*
c. Laminate — with well-marked blade and petiole.
d. Main rib single — pinnately veined.
e. Entire or nearly so, pointed at both ends and
f. Opposite, 3–5 in. long, of rather thick texture..9. NYSSA MULTIFLORA.
f^2. Alternate and
Large, 5–10 in. long, thinnish .....1. MAGNOLIA ACUMINATA.
Smaller, 3–6 in. long, thick, whitish and
Glaucous beneath, lanceolate to oval. ...51. MAGNOLIA GLAUCA.
Pubescent on veins beneath.....61. DIOSPYROS VIRGINIANA.
e^2. Serrate, serulate or dentate.
f. Inequilateral and cordate or truncate at base.
g. Ovate-orbicular, large, 4–5 in. or more in length.
3. TILIA AMERICANA.
g^2. Ovate, long-taper-pointed from a broad base.
12. CELTIS OCCIDENTALIS.
g^3. Ovate-oblong and
h. Very rough, especially above, rugose .....11. ULMUS FULVA.
h^2. Smoothish and
Flowers and fruit in fascicles. .....33. ULMUS AMERICANA.
Flowers and fruit in racemes.....34. ULMUS RACEMOSA.
f^2. Equilateral and obtuse, rounded or cordate at base.
g. Veins straight or nearly so, leaves thinnish.
h. Ovate-oblong
Coarsely serrate with remote teeth, one at the end of each vein, ciliate and covered with silky white hairs.
16. FAGUS FERRUGINEA.
Doubly and sharply serrate, nutlet inclosed in a papery sac.
41. OSTRYA VIRGINICA.
Unequally and sharply serrate, nutlet subtended by a leafy bract..... ..... 42. CARPINUS CAROLINIANA.
h^2. Ovate and
i. Finely and closely serrate, smooth, whitish and reticulate-veined beneath ..... .47. POPULUS BALSAMIFERA.
i^2. Doubly serrate and
j. Thinnish; petioles downy and of aromatic flavor.
Bark of trunk yellowish-gray .....17. BETULA LUTEA.
Bark reddish-brown... ....44. BETULA LENTA.
j.^{2} Thickish and bark white .....43. BETULA PAPYRACEA.
g^2. Veins incurved.
h. Orbicular heart-shaped, 4–6 in. long.....63. MORUS RUBRA.
h^2. Orbicular-ovate; petioles laterally compressed,
Coarsely dentate .... 18. POPULUS GRANDIDENTATA.
Serrate.....72. POPULUS TREMULOIDES.

*f*³. Equilateral and acute at base, tapering both ways.
g. Linear-lanceolate, tomentose on midrib above and petiole.
45. SALIX NIGRA.
*g*². Lanceolate or ovate-lanceolate, long-acuminate; capsules
Sessile or nearly so .....46. SALIX ALBA var. VITELLINA.
With slender pedicels.....71. SALIX AMYGDALOIDES.
*g*³. Oblong-lanceolate with teeth sharply
Awn-pointed and in about 20 pairs.....40. CASTANEA VESCA.
Mucronate and in 6–12 pairs..... 68. QUERCUS MUHLENBERGII.
Finely glandular-serrate .....55. PRUNUS PENNSYLVANICUM.
*g*⁴. Obovate-oblong, serrate, hairy under surface...56. PRUNUS AVIUM.
*g*⁵. Ovate, very smooth and shining..... ....57. PYRUS COMMUNIS.
*g*⁶. Wedge-obovate, veins very prominent..58. CRATAEGUS PUNCTATA.
*g*⁷. Ovate-oblong, veins incurved and petioles
h. With 2–4 glands, smooth ....29. PRUNUS SEROTINA.
*h*². Without glands,
Glabrous both sides, sharply serrate.
59. AMELANCHIER CANADENSIS.
Downy under-side and petiole .....30. PYRUS MALUS.
*f*⁴. Equilateral and truncate at base,
g. Serrate-dentate with cartilaginous teeth
Deltoid-ovate..... .....48. POPULUS MONILIFERA.
Broadly deltoid ....73. POPULUS DILATATA.
*g*². Irregularly serrate or obscurely lobed....70. BETULA POPULIFOLIA.
*e*³. Pinnatifid or lobed.
f. Moderately pinnatifid.
g. Oval, lobes bristle-pointed .....15. QUERCUS RUBRA.
Lobes obtuse and rounded ....38. QUERCUS ALBA.
*g*². Obovate or oblong, lyrate-pinnatifid and sinuses
Nearly to the midrib and roundish...39. QUERCUS MACROCARPA.
Usually not over half-way to the midrib and acutish.
66. Q. BICOLOR.
*f*². Deeply pinnatifid with mucronate teeth and broad rounded sinuses.
69. Q. COCCINEA.
*f*³. Broad, truncate at both base and apex, and with two spreading lobes on each side..... .....2. LIRIODENDRON TULIPIFERA.
*e*⁴. Wavy and spinous-toothed, very thick... .....52. ILEX OPACA.
*e*⁵. Undulately crenate-toothed; obovate to lanceolate..67. QUERCUS PRINUS.
*d*². Main ribs several — palmately-veined, etc.
e. Rib single at first but soon sending off a strong vein on each side and leaves 3-lobed, 2-lobed or entire.....32. SASSAFRAS OFFICINALE.
*e*². Ribs three at first, but soon five by branching, leaves alternate, base of petiole concave and fitting over the axillary bud.
13. PLATANUS OCCIDENTALIS.
*e*³. Ribs 5–7 from commencement; leaves opposite, base of petiole subtending (not covering) the axillary bud.
f. Moderately incised with broad lobes which are
Sparingly sinnate-toothed .....7. ACER SACCHARINUM.
Irregularly serrate and notched..... .....53. ACER RUBRUM.
*f*². Deeply incised with more or less acute sinuses and narrow divisions.
Star-shaped, lobes glandular serrate.
60. LIQUIDAMBAR STYRACIFLUA.
Palmate, lobes incisely toothed .....26. ACER DASYCARPUM.
*c*². Needle-shaped — without distinction of blade and petiole — short, about 1 in. in length, soft and in fascicles of many each..23. LARIX AMERICANA.
*b*². *Compound Leaves.*
c. Palmate, with 7, obovate, serrate leaflets....6. AESCULUS HIPPOCASTANUM.
*c*². Pinnate and with an odd terminal leaflet, leaflets all
d. Petiolulate.
e. Leaflets numerous, 21–41, each with one or two pairs of glandular teeth at its base.....4. AILANTHUS GLANDULOSUS.
*e*². Leaflets 7–9, ovate or lance-oblong, entire or obscurely serrate.
Petioles and branchlets glabrous..... 10. FRAXINUS AMERICANA.
Petioles and branchlets velvety pubescent..31. FRAXINUS PUBESCENS.

e^3. Leaflets 3–5, prominently veined, irregularly toothed.
54. ACER NEGUNDO.

d^2. Sessile or subsessile
e. Numerous (15–17) and pubescent, especially along the petioles and rachis.
f. Leaflets ovate-lanceolate, finely serrate; pubescence of short, rust-colored, clammy hairs.
Fruit subovoid, viscid-pubescent..... 14. JUGLANS CINEREA.
Fruit globose, roughly dotted (not viscid-pubescent).
35. JUGLANS NIGRA.
f^2. Leaflets lance-oblong, coarsely serrate; pubescence of copious, longer and white hairs..... .....5. RHUS TYPHINA.
e^2. Fewer, (5–11).
5, quite glabrous; fruit a ridged nut about 1 in. long with thick epicarp.....36. CARYA ALBA.
7–9, finely pubescent; nut ridged and larger.....64. C. SULCATA.
5–7, glabrous, obovate; nut quite smooth.....65. C. PORCINA.
7–11, lanceolate, acute at base, minutely glandular and pubescent beneath..... .....37. C. AMARA.
Oblong-lanceolate, glabrous, obtuse or rounded at base; fruit a samara, flat at base.....62. FRAXINUS SAMBUCIFOLIA.

b^3. *Decompound Leaves.*
c. Petioles smooth and leaves
Regularly bipinnate excepting for the lowest pair of single leaflets; leaflets stalked..... 27. GYMNOCLADUS CANADENSIS.
Irregularly bipinnate, leaflets small and sessile.
28. GLEDITSCHIA TRIACANTHOS.
c^2. Petioles prickly, leaves large with ovate, sessile, serrate leaflets.
8. ARALIA SPINOSA.

a^2. **Leaves Evergreen** — remaining on over winter.
b. Needle-shaped and quite stiff, pointing every way.
c. Long, 1 in. or more, in fascicles of
d. Two each, a broad membranous sheath inclosing the base of each fascicle.
Leaves slender, 3–5 in. long; scales of cone armed with a weak prickle.
75. PINUS MITIS.
Leaves thicker, 5–6 in. long; scales thickened but unarmed.
19. PINUS RESINOSA.
d^2. Three each, sheath short..... .....56. PINUS RIGIDA.
d^3. Five each, sheath deciduous.....49. PINUS STROBUS.
c^2. Short, 8 lines or less, scattered (not in fascicles), 4-angled, usually more or less curved..... .....20. ABIES NIGRA.
b^2. Linear, small, flat and diverging in two directions.
c. Petioled, obscurely denticulate, 8 lines or less in length.
21. ABIES CANADENSIS.
c^2. Sessile, entire, 8 lines or more in length.....22. ABIES BALSAMEA.
b^3. Scale-like or awl-shaped.
c. Imbricated and closely appressed in four ranks, but making a conspicuously flat and two-edged branchlet.. .....24. THUJA OCCIDENTALIS.
c^2. Scale-like, smaller, appressed in four ranks and making a rather 4-angled than flat branchlet; fruit a
Small spherical cone..... ... .74. CHAMAECYPARIS THYOIDES.
Bluish berry.....25. JUNIPERUS VIRGINIANA.

A KEY, BASED UPON THE FRUIT,

Designed as an Aid in Identifying the Species represented in Parts I, II and III when in Season for procuring the Fruit.

N. B.— The remarks concerning the use of the Key based upon the Leaves are equally true with reference to this.

a. **Free Fruit** — formed by the ripening of a single pistil either simple or compound,
b. *Indehiscent pericarp.*
c. Samara — dry, 1-celled, 1-seeded and with 1–2 membranous wings.
d. In terminal panicles; wing somewhat oblong-lanceolate, with a lenticular seed at about its center, and beyond which the wing is twisted (*Ailanthus*).....4. A. GLANDULOSUS.
*d*². In umbellate corymbs, each pedicel supporting a pair of samaræ with oblanceolate wings obtuse at the apex and with main rib on outer margin (*Acer*).
e. Fruit maturing in the fall, wings slightly divergent..7. A. SACCHARINUM.
*e*². Fruit maturing in early summer.
f. Large 1¼ in. or more, downy when young..... 26. A. DASYCARPUM.
*f*². Smaller, smooth, pendulous and
Red, in umbels.....53. A. RUBRUM.
Greenish in racemes wings incurved.....54. A. NEGUNDO.
*d*³. In axillary racemes or panicles, winged at the apex with a more or less lanceolate obtuse wing (*Fraxinus*),
e. Terete at base (seed-bearing portion); branchlets and petiols.
Smooth.....10. F. AMERICANA.
Velvety pubescent.....31. F. PUBESCENS.
*e*². Flat—wing extending along the seed-bearing portion.
62. F. SAMBUCIFOLIA.
*d*⁴. In lateral fascicles or clusters, winged all round (*Ulmus*),
Sessile or nearly so, cell pubescent and margin not ciliate..11. U. FULVA.
In fascicles, cell smooth, margin densely ciliate....33. U. AMERICANA.
In racemes, cell pubescent, margin ciliate.....34. U. RACEMOSA.
*c*². Drupe or drupe-like and with a single seed.
d. Fibro-fleshy and dryish pericarp.
e. Small, subglobose (*Rhus*) in terminal thyrses and clothed with crimson-acid hairs .....5. RHUS TYPHINA.
*e*². Large, about 2 in. in length, with edible embryo (*Juglans*).
Ovoid or oblong and clothed with brownish, fragrant-viscid hairs.
14. J. CINEREA.
Globose, roughly dotted (not viscid hairy).....35. J. NIGRA.
*d*². Fleshy pericarp.
e. Ovoid and
Clustered two or three together on a single axillary peduncle, bluish-black, stone striated.....9. NYSSA MULTIFLORA.
Racemed, bluish and with short, fleshy, reddish pedicels.
32. SASSAFRAS OFFICINALE.
*e*². Globular.
f. Purple or purplish black and
Solitary, of a sweet sugary flavor. .....12. CELTIS OCCIDENTALIS.
Racemed (or partially so), of a vinous, slightly astringent flavor.
29. PRUNUS SEROTINA.
In umbels, larger, of vinous flavor..... 56. P. AVIUM.
*f*². Red, small and very sour.....55. P. PENNSYLVANICUM.
*c*³. Drupe-like but containing more than one seed, subglobose and
d. Crowned with the persistent calyx-teeth.

Purple black, 5-seeded, in umbels.....8. ARALIA SPINOSA.
Red or purplish, 4–8-seeded, axillary .....52. ILEX OPACA.
*d*². Not crowned with calyx-teeth but scaly-bracted beneath, 2–5 seeded, bluish-black .....25. JUNIPERUS VIRGINIANUS.
*c*⁴. Nut — hard, single coat, and furnished with an involucral cup or covering.
d. Ovoid oblong or ellipsoidal, surrounded at its base with an involucral cup (*Quercus*), acorn borne
e. On the new wood of the season (*Leucobalanus*), cup
f. About ¼ enveloping the small, ovoid nut; scales thin and appressed.
68. Q. MUHLENBERGII.
*f*². About ½ enveloping the nut
Thick, scales very roughly tubercled, edge of cup rather inturned after shedding the nut; nut usually long-ovoid .....38. Q. ALBA.
Thinner, edges flaring out after shedding the nut, scales thinnish; peduncles shorter than petioles.....67. Q. PRINUS.
*f*³. About ½ enveloping the nut; scales loosely appressed; peduncles longer than petioles .....66. Q. BICOLOR.
*f*⁴. More than ½ enveloping the large, broad-ovoid nut; scales very loosely appressed and making a mossy fringe..... 39. Q. MACROCARPA.
*e*². On wood of the preceding season (*Melanobalanus*); cup
Saucer-shaped, very shallow, ¼ enveloping the nut, scales very closely appressed.....15. Q. RUBRA.
Top-shaped, ½ enveloping the acorn; scales thin and coarse.
69. Q. COCCINEA.
*d*². Club-shaped, short, surrounded with stiff hairs, tipped with the persistent recurved style and arranged in globular heads.
13. PLATANUS OCCIDENTALIS.
*d*³. Achenium-like, small and borne in short catkins.
Inclosed in a membranous inflated sac, catkin hop-like.
41. OSTRYA VIRGINICA.
Subtended by an enlarged leafy bract ... 42. CARPINUS CAROLINIANA.
*c*⁵. Nut-like, but not invested with an involucre, globose, about as large as peas and arranged in cymes with a large, leaf-like bract attached to each peduncle (*Tilia*) .....3. T. AMERICANA.
*c*⁶. Pod (legume) which is
Oblong, flat, about 2 in. broad and curved..27. GYMNOCLADUS CANADENSIS.
Linear, twisted and contorted, about 1 in. broad.
28. GLEDITSCHIA TRIACANTHOS.
*c*⁷. Pome; capsules
d. Cartilaginous.
e. Sunken at insertion of pedicel, globular and
Large, 1 in. or more, distinctly 5-celled.....30. PYRUS MALUS.
Small, more or less 10-celled..... 59. AMELANCHIER CANADENSIS.
*e*². Not sunken at insertion of pedicel, pyriform .....57. PYRUS COMMUNIS.
*d*². Not cartilaginous, 1–5 bony seeds.....58. CRATAEGUS PUNCTATA.
*c*⁸. Berry, large, globose with persistent thickish calyx at the base.
61. DIOSPYROS VIRGINIANA.
*b*². *Dehiscent pericarp.*
c. Subglobose, and
d. Coriaceous, dehiscent by
e. 2–3 valves and containing one or very few large seeds with smooth shining coat and a large scar (*Æsculus*), fruit prickly and leaflets 7.
6. ÆSCULUS HIPPOCASTANUM.
*e*². 4 valves (*Carya*).
f. Parting the whole length; nut ridged and shell thick.
Nut flattish-globular, scarcely 1 in. in length .....36. C. ALBA.
Nut globular-oval 1¼ in. or more in length.....64. C. SULCATA.
*f*¹. Not parting freely to the base; nut quite smooth.
Very thin-shelled, small, and kernel very bitter.....37. A. AMARA.
Thick-shelled and kernel only moderately brittle....65. C. PORCINA.
*d*². Covered with spines; dehiscent by 4 valves.
Nuts sharply three-angled, 2 together, involucre soft-prickly.
16. FAGUS FERRUGINEA.
Nuts subovoid, flattened, 1–3 together, involucral spines very sharp and hard.....40. CASTANEA VESCA, var. AMERICANA.

c^2. Small, ovoid-lanceolate pods arranged in catkins, opening by two valves and containing numerous seeds furnished with silky down; leaves

d. Orbicular-ovate; petioles flattened.

Dentate.....18. POPULOUS GRANDIDENTATA.

Finely serrate.....72. P. TREMULOIDES.

d^2. Ovate, closely serrate, whitish and reticulate-veined beneath. 47. P. BALSAMIFERA.

d^3. Deltoid-ovate.....48 P. MONILIFERA.

d^4. Broadly deltoid.....73. P. DILATATA.

d^5. Linear-lanceolate, tomentose on midrib above and petiole. 45. SALIX NIGRA.

d^6. Lanceolate or elliptic-lanceolate, smooth above; capsules

Sessile or nearly so.....46. SALIX ALBA var. VITELLINA.

With slender pedicels.....71. S. AMYGDALOIDES.

a^2. **Aggregated Fruit** -- composed of many carpels, either closed or open and cohering or closely massed together, forming a

b. Cone.

c. Scales of the cone open carpels (*Coniferæ*).

d. Scales many, persistent and spreading at maturity, each subtended by a bract; ovules 2, inverted.

e. Maturing the year after flowering (*Pinus*).

f. Cones oblong-ovoid, scarcely 2 in. long; scales armed with a weak deciduous prickle.....75. PINUS MITIS.

f^2. Cones ovoid pyramidal, about 2 inches long, carpellary scales thickened at the apex and

Smooth (unarmed).....19. PINUS RESINOSA.

Armed with a recurved prickle.....50. P. RIGIDA.

f^3. Cylindric, 4–6 in. long, scales thin and unarmed.....49. P. STROBUS.

e^2. Maturing the first season — the autumn after blossoming.

f. Ovoid or oblong, ½ in. long, pendent; bracts inconspicuous; scales persistent on the axis, thin and with eroded tip.....20. ABIES NIGRA.

f^2. Ovoid, small (8 lines or less), pendent, scales rounded and entire at tip. 21. ABIES CANADENSIS.

f^3. Cylindrical, large (2–4 in.), erect; bracts conspicuous, exserted; scales falling from the axis at maturity.....22. ABIES BALSAMEA.

f^4. Ovoid or roundish, small, 9 lines or less, scales persistent on the axis at maturity.....23. LARIX AMERICANA.

d^2. Scales few, persistent, bractless; cone

Oblong and erect, with loosely imbricated scales somewhat thickened at the tip, seeds winged all round.....27. THUGA OCCIDENTALIS.

Spherical, about ⅛ in. in diameter, with 3 pairs of peltate scales. 74. CHAMAECYPARIS THYOIDES.

c^2. Scales 3-lobed bracts each subtending 2–3 closed, indehiscent carpels— miniature samaræ (*Betula*).

f. Cones erect, short, scales thin and with barely spreading lobes, wings of seed not broader than the body.....17. B. LUTEA.

f^2. Cones suberect, ovoid-oblong; scales thicker and with short divergent lobes; wing of nutlet not broader than the body.....44. B. LENTA.

f^3. Cones pendent, cylindrical and about

1 in. in length.....70. B. POPULIFOLIA.

1⅛ in. in length.....43. B. PAPYRACEA.

c^3. Scales closed carpels, growing from an elongated receptacle and consolidated together.

d. Dehiscent at maturity along the medium line of the back, and letting out each 1-2 berry-like seeds suspended by extensile threads (*Magnolia*). Cone

Cylindrical, curved, 2–3 in. long.....1. MAGNOLIA ACUMINATA.

Oblong, 1–1½ in. long.....51. MAGNOLIA GLAUCA.

d^2. Indehiscent at maturity and falling away as samaræ. 2. LIRIODENDRON TULIPIFERA.

b^2. Spherical head, hardened and bristling with 2-beaked capsules. 60. LIQUIDAMBAR STYRACIFLUA.

b^3. Sorosis — a spike with bracts and calyx-lobes all thickened and succulent. 63. MORUS RUBRA.

A SYSTEMATIC STUDY

OF THE

Species whose Woods are Represented in the Accompanying Sections.

The timbers comprised in the series, which this text is designed to accompany, belong to what are known, botanically speaking, as *Flowering* and *Exogenous Plants*. At the outset, therefore, we will, once for all, define these groups; and, as the characters herein given are equally true of all the species enumerated in the following pages, they need not be repeated in the further definition of the various sub-groups and species.

FLOWERING or PHÆNOGAMOUS PLANTS.

Vegetables producing flowers which consist essentially of stamens and pistils, the latter bearing ovules or seeds.

In distinction from the *Flowering Plants* are the *Flowerless* or *Cryptogamous Plants*, comprising the rest of the vegetable kingdom, from the very simply organized Slime Moulds and Bacteria up to the highly organized Ferns and Club-Mosses. But in the study of timbers this group is unimportant, as only in a few rare cases do any of its representatives attain the dimensions of trees. Those exceptions are the Tree-Ferns of tropical countries — gigantic ferns, which sometimes attain the height of fifty or sixty feet, with straight shafts quite like tree trunks and tops consisting of a bunch of enormous plume-like fronds. They, however, are of practically no value as timber.

EXOGENOUS or DICOTYLEDONOUS PLANTS.

Flowering plants whose stems consist of a central column of pith surrounded by wood in concentric layers, and this in turn by bark; the stems increasing in thickness by the addition of a new layer each year to the wood externally and to the bark internally. Leaves mostly netted-veined. First leaves of the embryo (cotyledons) two and opposite, or (in the Coniferæ) several in a whorl. Parts of the flower in fours or fives, very rarely in threes.

A second class of *Flowering Plants* and comprising the rest of the group is the *Endogenous* or *Monocotyledonous Plants*, characterized by having stems in which the wood occurs as threads or bundles running through a cellular, pith-like tissue, so that a transverse section exhibits the wood as dots and not in concentric rings. Leaves mostly parallel-veined. Embryo with single cotyledon, or rarely two, and then alternate and unequal. Parts of the flower generally in threes. In southern United States and elsewhere in or near the tropics trees are found, such as the Palms, etc., which belong to this class, but none that we have to do with at present.

Exogenous plants are subdivided into two well-marked groups or sub-classes — *Angiospermæ* and *Gymnospermæ*. The former includes by far the greater part of the Flowering Plants, and is represented in Part I of this work by eighteen species. Let it be understood, therefore, that its characters, omitted in further descriptions, apply equally to all the species up to and including the eighteenth.

ANGIOSPERMÆ.

Flowering, exogenous plants in which there is a complete pistil — with stigma and closed ovary — containing ovules which develop into seeds at maturity. This sub-class comprises many groups of plants known as *Orders*, a few of which will be taken up in the following pages. Considering them in the sequence commonly accepted by botanists, we will first characterize the

ORDER **MAGNOLIACEÆ**: MAGNOLIA FAMILY.

Leaves alternate, simple, coriaceous, entire or lobed (never toothed), marked with minute transparent dots, feather-veined; leaf buds covered with membranous stipules, which soon fall away. *Flowers* single, large, polypetalous, polyandrous, polygamous, hypogenous, perfect; sepals and petals colored alike, in three or more circles of three each, imbricated in the bud, deciduous; anthers adnate; pistils numerous, packed together and covering the elongated receptacle, and forming in *Fruit* a sort of fleshy or dry cone containing one or two seeds in each carpel, with a minute embryo in fleshy albumen.

Trees or shrubs with aromatic and bitter bark.

GENUS MAGNOLIA, L.

Leaves folded lengthwise in the bud, embracing and embraced by the sheathing stipules. Leaf-buds conical. *Flowers* large, fragrant; sepals 3; petals 6–9; anthers longer than the filaments and opening inward; carpels 2-valved and 2-seeded, aggregated and coherent in a mass. *Fruit* a fleshy, somewhat woody cone, each carpel opening at maturity along its back, letting out its 1 or 2 berry-like seeds, suspended each by a long, extensile thread.

Trees and shrubs. (Genus named in compliment to Prof. Pierre Magnol, an early French botanist.)

51. MAGNOLIA GLAUCA, L.

SWEET BAY, SMALL MAGNOLIA, WHITE OR SWAMP LAUREL, BEAVER-TREE.

Ger., *Grauer Biberbaum;* Fr., *Magnolier glauque;* Sp., *Laurel dulce.*

SPECIFIC CHARACTERS: — *Leaves* scattered along the branches, thickish, entire, broadly lanceolate to oval, obtuse at apex, shining green above, glaucous whit-

ish beneath, 3–6 in. long, deciduous late or in the south evergreen; leaf-buds silky. *Flowers* (May–Aug.) white, globular, very fragrant and with cup-shaped, roundish petals about 2 in. long. *Fruit* a small oblong cone, 1–1½ in. long, reddish at maturity and bearing scarlet seeds.

(The specific name, *glauca*, is from the Greek γλαυκός, bluish gray, in allusion to the under surface of the leaf.)

A tree sometimes attaining the dimensions of 70 ft. (21 m.) in height, and 3 ft. (0.90 m.) or more in diameter of trunk, with smooth, gray bark which on very old trees becomes slightly roughened with small longitudinal fissures. It is deservedly popular for its handsome, fragrant flowers, and later for its scarcely less handsome, cone-like fruit, varying with age from green to light red at maturity, when each carpel opens and lets out one or two scarlet seeds, remaining suspended for a time by slender, white filaments. The bark and leaves possess a bitter aromatic flavor.

HABITAT.— From Massachusetts southward along the seaboard, in moist swampy soil, to Florida and Texas, reaching its greatest development in the south, while in the northern part of its range it is a mere shrub.

PHYSICAL PROPERTIES.—Wood soft, light, close-grained, not strong, compact, of a light-brown color, and with abundant creamy-white sapwood. *Specific Gravity*, 0.5035; *Percentage of Ash*, 0.47; *Relative Approximate Fuel Value*, 0.5011; *Coefficient of Elasticity*, 91299; *Modulus of Rupture*, 736; *Resistance to Longitudinal Pressure*, 424; *Resistance to Indentation*, 102; *Weight of a Cubic Foot in Pounds*, 31.38.

USES.— The wood is used to a moderate extent in the manufacture of small wooden-ware, but the chief value of the species lies in its handsome flowers and foliage, which place it in the foremost ranks for ornamental purposes.

MEDICINAL PROPERTIES.—The bark especially of the root of this species, in common with several other Magnolias, possesses gently stimulant, aromatic, tonic and diaphoretic properties. It is useful in the treatment of chronic rheumatism and intermittent and remittent fevers.* (See medicinal properties mentioned of *Magnolia acuminata*, Part I, pp. 39–40.)

ORDER **ILICINEAE**: HOLLY FAMILY.

Leaves simple, mostly alternate, coriaceous, ex-stipulate and mostly evergreen. *Flowers* small, white or greenish, axillary, 4–8-numerous and sometimes dicœcious; calyx minute, free, imbricated in the bud; corolla regular, cleft or almost parted, hypogynous, imbricated in the bud; stamens as many as the divisions of the corolla, alternate with them and attached to their base; anthers adnate, opening lengthwise; ovary free from the calyx, 4–8-celled, with a single suspended ovule in each cell; stigmas 4–8 or united into one, nearly sessile. *Fruit* drupaceous, with 4–8 anatropous seeds containing large fleshy albumen and minute embryo.

Trees and shrubs of over one hundred species, some of considerable economic value.

*U. S. *Dispensatory*, 16th ed., pp. 949–950.

GENUS ILEX, L.

Leaves alternate. *Flowers* lateral, single or clustered and usually perfect (but many are abortive), usually 4 (but sometimes 5–8-) numerous; calyx persistent; petals distinct or scarcely united at the base, obtuse, oval or obovate, spreading; stigmas separate or united. *Fruit* a berry-like drupe, and usually red or purple.
(*Ilex* is an ancient Latin name, but originally applied to a species of Oak.)

52. ILEX OPACA, AIT.

AMERICAN HOLLY.

Ger., *Amerikanische Steckpalme;* Fr., *Houx de l'Amerique;* Sp., *Acebo Americano.*

SPECIFIC CHARACTERS:—*Leaves* coriaceous, evergreen, oval, smooth, with margins deflexed, wavy and spinous-toothed. *Flowers* in loose lateral clusters on the new branchlets; calyx-teeth acute. *Fruit* a red, berry-like drupe, with sulcate nutlets ribbed on the back.
(*Opaca* is the Latin for *thick, shady.*)

A tree of moderate size and handsome aspect, owing to its rich evergreen foliage, and bright scarlet berries which remain on until spring. Though a shrub in the northern part of its range it sometimes in very favorable localities attains the height of 50 ft. (15 m.) and 3 or 4 ft. (1 m.) in thickness of trunk. The bark is smooth and of a light gray color; greenish when young.

HABITAT.—From Massachusetts southward through the Atlantic and Gulf States, and in the Mississippi valley as far north as Missouri, growing in moist lowlands.

PHYSICAL PROPERTIES.— Wood light, moderately hard, close-grained, compact and easily worked. Its color is buff-white, the heart-wood being only moderately darker than the abundant sap-wood. *Specific Gravity,* 0.5818; *Percentage of Ash,* 0.76; *Relative Approximate Fuel Value,* 0.5774; *Coefficient of Elasticity,* 64317 ; *Modulus of Rupture,* 686; *Resistance to Longitudinal Pressure,* 419; *Resistance to Indentation,* 176; *Weight of a Cubic Foot in Pounds,* 36.26.

USES.— The wood of this species is useful in turnery, for fancy work, and to some extent for furniture.

The sprays of Holly leaves and berries for decoctions are very popular and too well known to require comment.

MEDICINAL PROPERTIES of this species are said to be the same as those of the European Holly (*Ilex aquifolium,* L.). The berries are emetic, purgative and diuretic, ten or twelve usually being sufficient to produce action. To the leaves are ascribed some diaphoretic and febrifugal virtues, owing to a bitter principle known as *ilicin,* which they contain.*

**U. S. Dispensatory,* 16th ed., pp. 1823–4.

ORDER **SAPINDACEÆ**: SOAPBERRY FAMILY.

Leaves simple or compound. *Flowers* polypetalous, often irregular and mostly symmetrical; sepals and petals each 4–5, imbricated in the bud, the petals inserted with the 5–10 stamens on a perigynous or hypogynous disk; ovary 2–3-celled and lobed, usually 1–2 ovules, in each cell, embryo mostly convoluted; no albumen. *Fruit* a membranous, inflated pod, a leathery, thick, subspherical pod, with nut-like seeds, or a winged samara.

GENUS ACER, TOURN.*

Leaves opposite, simple, palmately-veined and 5 — or occasionally 3-lobed (compound in Negundo); stipules none. *Flowers* small, in axillary racemes or corymbs, regular, dicœcious or polygamo-dicœcious, usually unsymmetrical; pedicels not jointed; sepals 5 (or 4–9), more or less united, colored; petals sometimes wanting, but when present 5 (or 4–9), equal and furnished with short claws; stamens, commonly 8; ovary 2-lobed, formed of 2 united carpels, each bearing 2 ovules, only one of which commonly attains maturity; styles 2, long and slender, united only below and stigmatic down the inside. *Fruit* a double samara, finally separating when mature and ready to fall, the wings strengthened by a rib along one margin; cotyledons long and thin.

(Ancient Latin name of the Maple.)

53. ACER RUBRUM, L.

RED MAPLE, SWAMP MAPLE, SOFT MAPLE, RED-FLOWERED MAPLE.

Ger., *Rother Ahorn;* Fr., *Erable rouge;* Sp., *Arce rojo.*

SPECIFIC CHARACTERS: — *Leaves* 3–5-lobed with acute sinuses, lobes acute and irregularly serrate-toothed, whitish and sometimes pubescent beneath, usually more or less heart-shaped at base. *Flowers* (April) much preceding the leaves, in lateral fascicles with short erect pedicels, usually bright red; petals linear-oblong; stamens much longer than the petals; ovaries smooth. *Fruit* on prolonged drooping pedicels, smooth, mostly red, with wings not widely divergent and about 1 in. in length.

(*Rubrum* is the Latin for *red*, descriptive of the color of flowers, etc.)

A tree sometimes attaining the height of 80 ft. (24 m.) and 4 ft. (1.20 m.) or more in thickness of trunk, with smooth, bluish-gray bark which with age becomes cleft into loose longitudinal ridges. It is the first tree of its region to betoken, with its early flowers, the approach of spring. The buds swell before the snow has entirely disappeared, and soon the red twigs and flowers together give the tree a very conspicuous appearance. When in full leaf it is also a beautiful tree, and on the approach of autumn, before the appearance of frost often, the foliage assumes bright orange and red tints which make it one of the most striking, in appearance, of our forest trees.

HABITAT.— Canada and Eastern United States generally, growing along streams subject to inundation, and in swamps, but occasionally on drier uplands.

PHYSICAL PROPERTIES.—Wood moderately heavy, hard and elastic, close-grained, compact and taking a very smooth polish. It is of a

* As here defined, the genus includes *Negundo*, ranked by some authors as a separate genus and differing from *Acer* proper in the leaves being compound and flowers dicœcious.

brownish-white color with irregular brown and sometimes reddish heart. *Specific Gravity*, 0.6178; *Percentage of Ash*, 0.37; *Relative Approximate Fuel Value*, 0.6155; *Coefficient of Elasticity*, 94284; *Modulus of Rupture*, 811; *Resistance to Longitudinal Pressure*, 463; *Resistance to Indentation*, 176; *Weight of a Cubic Foot in Pounds*, 38.50.

USES.—A valuable timber in the manufacture of shovels, bowls and small wooden-ware generally; for cabinet-making, turnery, etc. It is occasionally found showing the "curly figure," similar to that of the Silver-leaved Maple (Part II, No. 26[a]), and such timber is of great value for gun-stocks, veneering for choice furniture, and interior finishing. The "birds-eye figure" is much more rare in this than in the Sugar Maple.

The sap of the Red Maple is not as rich in sugar as that of the Sugar Maple, but the trees are often tapped and an excellent quality of sugar is produced.

A bluish-black ink and dye is made by boiling the bark of this tree with sulphate of iron and alum, while the bark with alum alone is said to produce a lasting cinnamon-color dye.

MEDICINAL PROPERTIES are not claimed of this species.

54. ACER NEGUNDO, L.*

BOX-ELDER, ASH-LEAVED MAPLE, NEGUNDO.

Ger., *Eschenblättriger Ahorn;* Fr., *Erable à feuilles de frène;* Sp., *Negundo de Arce.*

SPECIFIC CHARACTERS:—*Leaves* pinnately compound with 3-5 smoothish leaflets which are prominently veined, ovate, acuminate, irregularly toothed and sometimes lobed, petiolate, the terminal one largest; petioles long and toward autumn bright, red on the uppermost side. *Flowers*, dioecious, appearing from lateral buds in clusters with long, delicate, filiform pedicels rather before the leaves; calyx minute; 4–5-cleft; petals wanting; staminate flowers in fascicles; stamens 4–5; disk, none; anthers linear; pistillate flowers in pendulous racemes. *Fruit*, smooth, with large, incurved wings broadest toward the end.

(The derivation of the specific name, *Negundo*, is unknown. It is thought, according to D. J. Browne,† to have originated among the early French of Illinois, where the tree is called *Erable à giguieres* which signifies literally the romping, frisky Maple, in allusion to the motion of the long stemmed leaves.)

A handsome spreading tree not often over 70 ft. (21 m.) in height or 3 ft. (0.90 m.) in diameter of trunk, with delicate light-green foliage and pea-green twigs. The bark of the trunk is of a brownish gray color, rough, with narrow, longitudinal ridges. The odor of the bruised bark

* This is the *Negundo aceroides*, Moench, of some authors. The Californian Box Elder, until recently considered a distinct species (*Negundo Californicum*), it being more pubescent and having more lobed leaflets than our eastern tree, Prof. Sargent finds is apparently, without doubt, merely a western variety and not entitled to specific rank. He makes it *N. aceroides var. Californicum*.

† *Trees of America*, p. 106.

is quite similar to that of the Elder, and the leaves very much resemble in general appearance those of the Ash, but more closely those of the Poison Ivy (*Rhus Toxicodendron*).

HABITAT.—A tree of very wide geographical distribution, being found in western New England and thence westward to the base of the Rocky Mountains, and southward to Florida, Texas and into Mexico. West of the Great Lakes it ranges northward into Manitoba, and the Californian variety extends its range to the Pacific coast in that State. It grows in moist bottom-lands and along the borders of streams, reaching its greatest development in the valley of the Ohio river.

PHYSICAL PROPERTIES.— Wood rather light and soft, close-grained and of a light yellowish color with abundant lighter sap wood. *Specific Gravity*, 0.4328; *Percentage of Ash*, 1.07; *Relative Approximate Fuel Value*, 0.4282; *Coefficient of Elasticity*, 58156; *Modulus of Rupture*, 529; *Resistance to Longitudinal Pressure*, 322; *Resistance to Indentation*, 111; *Weight of a Cubic Foot in Pounds*, 26.97.

USES.— The wood of this tree is occasionally used for interior finishing, wooden-ware, paper-pulp, cooperage, fuel, etc. Maple sugar is sometimes made from its sap, though in smaller quantity in proportion to the amount of sap than with the Sugar Maple.

For ornamental purposes the tree is of considerable value in its natural foliage, but there are also variegated and highly colored sports which are very popular and more highly valued.

MEDICINAL PROPERTIES are not officinally recognized of this species.

ORDER ROSACEÆ: ROSE FAMILY.

Leaves alternate and with stipules which sometimes fall early or are rarely wanting. *Flowers* regular; sepals 5 or rarely fewer, united at the base and often furnished outside with bractlets resembling the sepals; petals as many as the sepals, or, rarely, wanting, distinct and inserted on a disk which lines the calyx-tube; stamens distinct, numerous (with rare exceptions) and inserted with the petals on the disk of the calyx tube; pistils 1–many distinct or united and often combined with the calyx-tube. *Fruit* various, as drupe, pome, achenium, etc.; seeds solitary or few, mostly albumenless, with straight embryo and large thick cotyledons.

Trees, shrubs and herbs, many of great economic value in the production of most useful fruits, beautiful flowers, choice perfumes, etc.

GENUS PRUNUS, TOURN.

Leaves simple; stipules free and commonly deciduous. *Flowers* perfect, with calyx regular, free and falling away after flowering; petals widely spreading; stamens 15–30; pistil solitary with style terminal or nearly so and ovary containing 2 pendulous ovules. *Fruit* a drupe, fleshy with a smooth 1-seeded (rarely 2-seeded) stone.

Trees, and shrubs. ("*Prunus*" is the ancient Latin name of the plum-tree.)

55. PRUNUS PENNSYLVANICA, L. f.

WILD RED CHERRY, PIGEON CHERRY, PIN CHERRY, BIRD CHERRY.

Ger., *Tauben-Kirsche;* Fr., *Ceresier du pigeon;* Sp., *Cerezo de paloma.*

SPECIFIC CHARACTERS:—*Leaves* oblong-lanceolate with tapering point, 2–5 inches long, finely and sharply glandular-serrate, thin, shining, green and smooth both sides. *Flowers* white in corymbose-umbels with long pedicels from lateral buds and appearing with the leaves. *Fruit* (July–Aug.) a very small subglobose drupe, smooth, light-red with thin sour flesh and smooth globular stone.

A small, handsome tree rarely more than 40 ft. (12 m.) in height or 18 in. (0.46 m.) in diameter of trunk, and often a mere shrub. A striking feature is its smooth, reddish-brown bark, which peals off in thin strips transversely around the tree. The beauty of the tree is enhanced in fruiting season by the small bright-red cherries, which are eagerly eaten by the robins and waxwings.

HABITAT.— Canada and north-eastern United States, as far north as the shores of Hudson's Bay, westward to Iowa and the mountains of Colorado, and southward among the Alleghany Mountains to North Carolina. It grows in dry rocky soil, everywhere quickly appearing from seeds scattered by the birds, on tracts recently burned over by forest-fires.

PHYSICAL PROPERTIES.—Wood light, moderately soft, close-grained and of a light-brown color with thin, lighter sap-wood. *Specific Gravity,* 0.5023; *Percentage of Ash,* 0.40; *Relative Approximate Fuel Value,* 0.5003; *Resistance to Longitudinal Pressure,* 407; *Resistance to Indentation,* 103; *Weight of a Cubic Foot in Pounds,* 31.30.

USES.—Too small a tree to be of commercial value, and the wood is little used.

MEDICINAL PROPERTIES.— In domestic practice the bark of this tree, which is very bitter, is used (like that of the Black Cherry) as a tonic, in the form of an infusion with cider.

56. PRUNUS AVIUM, L.

OX-HEART CHERRY, ENGLISH CHERRY.

Ger., *Süsser Kirschbaum;* Fr., *Mérisier;* Sp., *Cerezo.*

SPECIFIC CHARACTERS.—*Leaves* obovate-oblong, 3–6 in. in length, acuminate, serrate, with hairy under surface; petioles 1–2 in. long and usually furnished with a pair of glands near the leaf-blade. *Flowers* appearing with the leaves, white, in lateral, sessile umbels with rather long pedicels. *Fruit* a smooth, globular drupe, subcordate at base, red of various shades, firm, juicy and of vinous flavor; stone smooth and globular.

(*Avium* is a Latin word, meaning *of the birds,* and applicable to this species on account of the fondness of certain birds for its fruit.)

A tree with roundish ovoid or somewhat pyramidal head, sometimes attaining the height of 50 ft. (15 m.) and 3 ft. (0.90 m.) in diameter of trunk, though usually much smaller and rarely ever larger. Its bark is of a bluish-gray color, close and smooth, peeling off in strips transversely around the tree.

When growing in the forest the tree develops a long straight trunk.

HABITAT.—The native habitat of this tree is Europe and Central Asia, from whence it has been extensively introduced into this country, and is cultivated in many varieties. It is found now growing naturally in many localities, and hence the importance of including it in this work.

Of its occurrence in western New York, Prof. W. R. Dudley* says that it is found in "all ravines near Ithaca and especially abundant on both shores of the lake (Cayuga), where it forms thickets and groves."

PHYSICAL PROPERTIES. — Wood rather light, soft, close-grained and easily worked. It is of a rich reddish-brown color, with scant sapwood much lighter.

USES.—The chief economic value of the tree lies in its fruit, for which it holds a high rank. The wood is not, so far as we know, used to any extent in this country, excepting occasionally for fuel, though it is of excellent quality, and, if abundant, would doubtless be as popular as the native Black Cherry to which it is scarcely inferior.

There is a double-flowered form of this species which does not develop fruit. It is a very ornamental tree and attains a considerable size.

MEDICINAL PROPERTIES are not ascribed to this species, though its bitter bark doubtless possesses the tonic and sedative virtues mentioned (Part II, p. 18) of the *P. serotina*.

GENUS PYRUS, L.

Leaves simple or pinnate; stipules free. *Flowers* white or rose-colored in corymbed cymes; calyx-tube urn-shaped, becoming thick and fleshy in the fruit, limb 5-cleft; petals 5, obovate or roundish; stamens numerous; styles 5 (or sometimes 2–3), and carpels of the same number 2-seeded, with papery or cartilaginous endocarp and united with the calyx-tube. *Fruit* a closed pome, fleshy or berry-like.

Trees or shrubs. ("*Pyrus*" is the ancient Latin name of the pear-tree.)

57. PYRUS COMMUNIS, L.

PEAR.

Ger., *Birnbaum;* Fr., *Poirier commun;* Sp., *Peral.*

SPECIFIC CHARACTERS:—*Leaves* simple, ovate or ovate-lanceolate, more or less serrate, acute or acuminate, 2–4 inches long, very smooth and shining above, glabrous beneath. *Flowers* in racemous-corymbs, white and scentless; calyx and pedicels pubescent; styles 5, distinct and villous at base. *Fruit* a pome, usually elongate, attenuated at base and not sunken at the insertion of the peduncle.

*The Cayuga Flora, p. 27.

A tree usually of pyramidal shape, and under most favorable conditions sometimes attaining the height of 50 ft. (15 m.) with a trunk 2 ft. (0.60 m.) or more in diameter.

In its wild, native state it is a small thorny tree with leaves more markedly serrate and sometimes pubescent, and its small fruit austere and not eatable. It has been vastly improved by cultivation, and innumerable forms now exist in all temperate climes bearing delicious fruit in endless variety.

HABITAT.—The wild pear, which is the common parent of the many cultivated forms, is a native of Europe and the temperate portions of Asia. In this country the tree is found occasionally escaped from cultivation and growing self-sown in pastures and ravines, showing that it is thoroughly naturalized. The fruit from these trees is of very inferior quality.

PHYSICAL PROPERTIES.—Wood rather light, hard, very close-grained and taking a satiny polish. It is of a chocolate-brown color with abundant pinkish-white sap-wood.

USES.—Little need be said of the utility of this important fruit tree, the delicious fruit of which is too well known to require comment.

The wood is said to be used in Europe to some extent for coarse wood-engraving, in turnery and for joiner's tools. It is also useful for furniture and makes excellent fuel.

MEDICINAL PROPERTIES are not officinally recognized of this species, but it is said that "Pears were considered by the Romans as an antidote to the effect of eating poisonous mushrooms; and up to the present time perry is said to be the best remedy that can be employed for the same purpose." *

NOTE.—The longevity, growth and productiveness of the Pear tree in the Old World must greatly surpass what we see in this country, as we find mention of one tree "upwards of a century old and which in the season of 1826 bore one ton of pears." Again we read of an extraordinary tree in its prime in the latter part of the last century, "growing on the glebe land of the parish of Hon. Lacey [near Hereford, England] that more than once filled fifteen hogsheads with perry in the same year." †

GENUS CRATAEGUS, L.

Leaves simple and generally lobed; stipules free, and, as with the awl-shaped bracts, deciduous. *Flowers* mostly in corymbs, white or rarely rose-colored; calyx urn-shaped with limb 5-cleft, persistent; petals roundish; ovaries 1–5, inferior; styles as many as the ovaries. *Fruit* a fleshy, drupe-like pome containing 1–5 hard 1-seeded carpels and bearing on its summit the persistent calyx-lobes.

Small trees and shrubs armed with thorns, and petioles, calyx-teeth, etc., often beset with glands.

(*Crataegus* is from the Greek *Κράτος, strength*, in allusion to the nature of the wood.)

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* *The Trees of America*, by D. J. Browne, p. 295.
† *The Trees of America*, by D. J. Browne, p. 289.

58. CRATAEGUS PUNCTATA, JACQ.

DOTTED-FRUITED THORN, THORN-APPLE.

Ger., *Geflecte Mispel;* Fr., *Néflier à fruits pointillés;* Sp., *Espino puntuado.*

SPECIFIC CHARACTERS:—*Leaves* wedge obovate, 1½ to 2½ in. long, narrowing to a short petiole, entire at base, unequally or doubly and sometimes incisely serrate above, veins prominent; villous-pubescent but becoming smooth and dull above; glands wanting. *Flowers* (April–June) white, in somewhat compound corymbs of 8–15 flowers each, calyces pedicels and newer growth villous-pubescent. *Fruit* (ripe in September) globose, ½–1 in. in diameter, pendulous, red or yellowish and puncate with white dots, edible.

(*Punctatum* is the Latin for *spotted*, applying to the dotted nature of the fruit.)

Small trees sometimes 25 ft. (7–8 m.) in height and 10 or 12 inches (0.30 m.) in diameter of trunk, with wide-spreading, crooked branches, gray bark rough with loosely adhering longitudinal ridges, and usually bearing stout sharp thorns 1 to 2 inches in length. The appearance of the tree in late summer when in full leaf and bearing its red handsome fruit is very pleasing.

HABITAT.—Canada and eastern United States southward to Georgia, along hill-sides and in dry rocky soil.

PHYSICAL PROPERTIES.—Wood moderately heavy, hard, strong and close-grained, yielding a very smooth surface, of a light chocolate-brown color with light yellowish-brown sap-wood. *Specific Gravity,* 0.7681; *Percentage of Ash,* 0.47; *Relative Approximate Fuel Value,* 0.7645; *Weight of a Cubic Foot in Pounds,* 47.87.

USES.—A tree of little economic value owing to its small size, though interesting for ornamental purposes and excellent for fuel.

MEDICINAL PROPERTIES.—None are claimed of this species.

GENUS AMELANCHIER, MEDIC.

Leaves deciduous, simple, sharply serrated; stipules free from the petiole. *Flowers* in racemes, white; calyx 5-cleft, tube adherent to ovary, lobes downy within; petals 5, elongated (oblong to oblanceolate); stamens short and numerous; styles 5, united below; ovary 5-celled at first with 2 ovules in each cell, but later a false partition forms between each pair of ovules so as to make in *Fruit* (if all seeds develop) a more or less distinctly 10-celled pome with one seed in each cell.

Small trees and shrubs. (*Amelanchier* is the popular name in Savoy of the common European species.)

59. AMELANCHIER CANADENSIS, TORR. and GRAY

JUNE-BERRY, SERVICE-TREE, SHAD-BUSH, SHAD-BLOW.

Ger., *Gewöhnliche Traubenbirne;* Fr., *Grand Amelanchier;* Sp., *Nispero.*

SPECIFIC CHARACTERS:— *Leaves* ovate or oblong-ovate, 1–3½ in. long, usually more or less cordate at base, tapering to a sharp point, very sharply serrate, downy when young, but soon glabrous both sides; stipules and bracts long-silky-ciliate. *Flowers* (early spring with or before the leaves) large, white, in terminal, loose, drooping and nearly glabrous racemes; petals oblong, ½–¾ in. in length. *Fruit* (June–July) on elongated pedicels, globose, reddish-purple, sweet and of pleasant flavor, about ¼ in. in diameter.

☞ There are several varieties of this species, but rather of a shrubby nature than arborescent.

A small tree sometimes 40 ft. (15 m.) in height and 15 in. (0.45 m.) in diameter of trunk, with smooth reddish-green bark, and often a mere shrub. It is one of the first trees of spring to put forth its handsome, white flowers, and then, before the leaves of the surrounding forest have appeared, it is a conspicuous and beautiful object — a welcome harbinger of spring. It is from this trait of blossoming early, at the time when the shad ascend the rivers, that it is called the Shad-bush and Shad-blow.

HABITAT. — Canada from the shores of Hudson's Bay southward throughout eastern United States to Florida and westward to Minnesota and Indian Territory, growing along hill-sides and in dry, open woods.

PHYSICAL PROPERTIES.—Wood heavy, hard, strong, close-grained and taking a satiny finish: It is of a reddish-brown color, with thick sap-wood much lighter, and usually marked with spots and streaks of red. *Specific Gravity*, 0.7838; *Percentage of Ash*, 0.55; *Relative Approximate Fuel Value*, 0.7795; *Coefficient of Elasticity*, 119677; *Modulus of Rupture*, 1132; *Resistance to Longitudinal Pressure*, 670; *Resistance to Indentation*, 280; *Weight of a Cubic Foot in Pounds*, 48.85.

USES.— The wood of this tree is not extensively used owing to its generally small size and limited quantities, though it is said to be excellent for making fish-rods (going by the name of *American Lance-Wood*) and is also valuable for tool-handles.

The tree is growing in popularity for ornamental purposes, where it receives special favor on account of its early blossoms. The fruit of some of the shrubby forms, we are told, is used by the country people of some sections as an article of food.

MEDICINAL PROPERTIES are not known of this species.

ORDER **HAMAMELACEÆ**: WITCH HAZEL FAMILY.

Leaves alternate, simple; stipules deciduous. *Flowers* in heads or spikes, often polygamous or monœcious; calyx-tube coherent with the base of the ovary; petals 4–5, linear or narrow, inserted on the calyx; stamens twice as many as the petals,

with half of them sterile and scale-like, or numerous; pistils 2, united below, each 1-celled and with 1 or several ovules in each cell. *Fruit*, a 2-beaked, 2-celled, woody capsule, opening at the summit and with 1 or 2 bony anatropous seeds in each cell, with large straight embryo and scanty albumen; cotyledons broad and flat.

Trees and shrubs of about twenty species.

GENUS LIQUIDAMBAR, L.

Leaves as described for the order. *Flowers* monœcious or polygamous, naked; the *sterile* in a conical ament, stamens numerous with minute scales intermixed; filaments short; the *fertile fl's*, in globose heads consisting of many 2-celled, 2-beaked, long styled ovaries, subtended by minute scales which represent the calyx, all cohering, styles stigmatic down the inner side; ovules numerous but only one or two perfecting; heads nodding, racemed and while in bud enclosed by a 4-leaved deciduous involucre. *Fruit*, a hardened spherical head, bristling with the two-peaked capsules which open (between the peaks) at maturity to liberate the 1 or 2 wing-angled perfect seeds from each cell, and numerous undeveloped seeds.

Trees with fragrant leaves and exuding a fragrant balsamic juice. (Name from Latin *liquidus, fluid*, and Arabic *ambar, amber*, in allusion to the exudation.)

60. LIQUIDAMBAR STYRACIFLUA, L.

SWEET GUM, BILSTED, RED GUM.

Ger., *Storaxbaum;* Fr., *Copalm;* Sp., *Liquidambar.*

SPECIFIC CHARACTERS:— *Leaves* palmate, nearly orbicular in outline, with 5–7 acuminate, glandular-serrate lobes, villous pubescent at base of veins, otherwise smooth and shining. *Flowers* (April–May) and *fruit* as described for the genus.

(*Styraciflua* is from the Latin *styrax, a resinous gum*, and *fluo, to flow*, alluding to the exudation of the tree.)

One of the most beautiful trees of our American forests, with tall straight trunk clothed in a soft grayish-brown bark rough with narrow longitudinal ridges, and usually a pyramidal top with short branches. A striking feature is its star-shaped leaves, and often its twigs are furnished with deep corky flanges, though many individual trees lack this character. It sometimes considerably surpasses 100 ft. (30 m.) in height and is 4 or 5 ft. (1.50 m.) in diameter of trunk.

In autumn the foliage of the Sweet Gum, which has hitherto been of a rich green color, turns to a brilliant scarlet, the splendor of which is scarcely surpassed by any of our trees. The tree exudes when bruised a yellowish, transparent juice of about the consistence of honey, of agreeable balsamic odor and warm acrid flavor. This product is most abundant in the warmer climates.

HABITAT.— It ranges throughout eastern United States from southern Connecticut southward to Florida, westward to Texas, and into Mexico. It is especially well developed in the Gulf States and along the Mississippi basin, preferring wet soil and especially the swampy river banks which are frequently inundated.

PHYSICAL PROPERTIES.—Wood rather heavy and soft, close-grained, tough and taking a satiny polish, with irregular heart of various shades

of brown tinted with red, and marked with dark wavy rings which, though concentric, are wholly independent of the annual rings. The sap-wood is of a creamy-white color.

The wood naturally warps and twists badly in drying, but this objection is largely overcome by steaming it thoroughly immediately after sawing, and then drying. *Specific Gravity*, 0.5909; *Percentage of Ash*, 0.61; *Relative Approximate Fuel Value*, 0.5873; *Coefficient of Elasticity*, 86388; *Modulus of Rupture*, 651; *Resistance to Longitudinal Pressure*, 466; *Resistance to Indentation*, 132; *Weight of a Cubic Foot in Pounds*, 36.82.

USES.— A very important wood in the manufacture of wooden-ware and in certain sections for shingles, clap-boards, paving-blocks, etc. It is also being largely used of late in the manufacture of furniture and for interior finishing.

As an ornamental tree it is of high value, having many attributes which strongly commend it.

The exudation of the tree is said to be used to some considerable extent in the preparation of chewing gum and as a perfume for the breath.

MEDICINAL PROPERTIES.— The juice is used as a stimulating expectorant, for catarrhal affections and in the preparation of excitant ointments, and a syrup made from the bark is used in the Western States with great advantage in the treatment of dysentery, etc., especially in children.*

It might be added that the storax of commerce is mainly, if not exclusively, the product of the allied *Liquidambar Orientalis*, Mill., a tree of Asia Minor. The medicinal properties are practically the same as above indicated.

ORDER EBENACEÆ: EBONY FAMILY.

Leaves alternate, extipulate, coriaceous, entire. *Flowers* dicœcious or polygamous, regular and axillary; calyx free, 3–7-cleft with divisions nearly equal and persistent; corolla 3–7-cleft, mostly pubescent; stamens 2–4 times as many as the lobes of the corolla, anthers turned inward; ovary 3–12-celled with 1 or 2 seeds suspended from the summit of each cell; styles distinct or united and stigmas as many as the cells of the ovary. *Fruit* a fleshy roundish berry with large flat anatropous seeds, with smooth coriaceous integument, abundant albumen and foliaceous cotyledons.

Trees and shrubs with juice not milky and usually hard, dark-colored heart wood. The ebony of commerce is a product of this order, coming from several trees mainly of tropical Asia and Africa, that from the *Diospyros reticulata* of the island of Mauritius being considered the best.

GENUS DIOSPYROS, L.

Leaves as described for the order. *Flowers* dicœciously polygamous, axillary and nearly sessile; calyx 4–6-lobed, tubular or campanulate, convolute in the bud; the *sterile flowers* often clustered, with commonly 16 stamens (but sometimes 8 or more than 16); filaments short, ovary abortive; the *fertile flowers* larger and solitary, with 8 imperfect stamens; style 2–4-cleft. *Fruit* a large, globose berry with persistent, thickish calyx at the base and containing mostly 8 (4–12) seeds, one in each cell.

*U. S. *Dispensatory*, 16th ed., pp. 1431, 1843–4.

61. DIOSPYROS VIRGINIANA, L.

PERSIMMON, DATE-PLUM.

Ger., *Virginische Dattelpflaume;* Fr., *Plaqueminier de Virginie;* Sp., *Persimon.*

SPECIFIC CHARACTERS:— *Leaves* thickish, ovate-oblong, abruptly pointed, entire, smooth or nearly so above and somewhat pubescent on the veins beneath and petioles. *Flowers* (June) 4-numerous, corolla pale greenish-yellow, somewhat bell-shaped, thickish, over ½ in. in length in the fertile flowers and less in the sterile. *Fruit* (October and November) as described for the genus, about 1 in. in diameter, orange red and exceedingly astringent until after the occurrence of frost when it becomes palatable and delicious. In the south, however, this austerity is not so marked, and the agency of the frost there does not seem to be required for rendering the fruit edible.

Usually a small tree, but under favorable conditions attaining the height of 80 ft. (26 m.) with a trunk 2 ft. (0.60 m.) in diameter, and rarely even surpassing those dimensions. It develops a straight, round trunk covered with a very characteristic dark-brown bark, furrowed by longitudinal ridges which are cut by transverse checks into squares and polygons. Bark very astringent and bitter.

It yields such an abundance of fruit at times as to leave the ground beneath almost covered with its seeds after the fruit has decayed.

HABITAT.— Eastern United States from Rhode Island and Connecticut southward to Florida and Texas, and is especially well developed in the Ohio valley, growing in woods and old fields.

PHYSICAL PROPERTIES.— Wood rather heavy, hard, strong, close-grained and taking a beautiful polish. The heart-wood is of a dark-brown color or black and the sap light-yellow bearing black spots. The heart-wood is only apparent in very old trees. A tree about 14 inches in diameter, felled for the accompanying sections, contained upwards of sixty rings of sap-wood, and only two or three of the small heart which was scarcely thicker than a lead pencil. Other trees examined, by boring into them with an auger, in hopes of finding one with larger heart, proved to be no better. *Specific Gravity,* 0.7908; *Percentage of Ash,* 0.96; *Relative Approximate Fuel Value,* 0.7832; *Coefficient of Elasticity,* 78234; *Modulus of Rupture,* 879; *Resistance to Longitudinal Pressure,* 503; *Resistance to Indentation,* 324; *Weight of a Cubic Foot in Pounds,* 49.28.

USES.—The wood is used to some extent in the manufacture of shoe-lasts, plane-stocks, etc., and particularly for shuttles.

Although the fruit is of considerable value the tree is not often grown for that alone. It is thought, however, that by careful selection and cultivation the fruit might become so much improved as to make this an important fruit-tree — possibly equal to the Japanese tree.

The seeds when dried, roasted and ground are used in some parts of Georgia as a substitute for coffee.*

MEDICINAL PROPERTIES.—The bark is said to have been used advantageously in intermittents, and in the form of a gargle in ulcerated sore throat. The unripe fruit which is rich in tannin has been used in cases of diarrhœa, chronic dysentery and uterine hemorrhage. It is given in infusion, syrup and vinous tincture, prepared in the proportion of about an ounce of the bruised fresh fruit to two fluidounces of the liquid, and administered in the dose of a fluidrachm or more for infants and half a fluidounce or more for adults.*

ORDER **OLEACEÆ**: OLIVE FAMILY.

Leaves opposite and single or pinnately compound. *Flowers* monopetalous (rarely apetalous or polypetalous); calyx 4-cleft, toothed or entire, or sometimes wanting; corolla regular, 4-cleft (or sometimes 4-petalous, or even wanting altogether); stamens only 2 (or rarely 4); ovary 2-celled with usually 2 suspended ovules in each cell. *Fruit* fleshy or capsular, containing 4 (or fewer) seeds.

Represented by trees and shrubs.

GENUS FRAXINUS, TOURN.

Leaves petioled, oddly-pinnate, with 3–15 toothed or entire leaflets. *Flowers* small, racemed or panicled, from the axils of the last year's leaves, the American representatives dicœcious and apetalous; calyx and corolla, when present, as described for the order; anthers large, linear or oblong; style single, stigma 2-cleft. *Fruit* a 1–2-celled, flattened samara, winged at the apex, 1–2 pendulous seeds in each cell.

(The ancient Latin name of the Ash; supposed to be from the Greek φράξις, *a separation*, alluding to the facility with which the wood splits.)

62. FRAXINUS SAMBUCIFOLIA, LAM.

BLACK ASH, HOOP ASH.

Ger., *Schwarze Esche;* Fr., *Frêne noire;* Sp., *Fresno negro.*

SPECIFIC CHARACTERS:—*Leaflets* 7–11, oblong-lanceolate, 3–4 inches long, the lateral sessile, taper-pointed, abrupt at base, serrate, smooth both sides, but tawny-villous in the axils of the veins beneath, especially when young; buds short, dark blue. *Flowers* (May) as described for the genus, naked (no calyx) and with short oblong anthers. *Fruit* a linear-elliptical samara, obtuse and alike at both ends, the wing extending along the sides of the seed-bearing portion to the naked base, about 1¼ in. long.

(*Sambucifolia* is from L., *sambucus*, elder, and *folium*, leaf, alluding to the resemblance of the leaves of this ash to those of the elder.)

A tree usually of slim habit of growth, sometimes attaining the height of 80 ft (26 m.) or more, with a clear, straight trunk rarely more than 2 ft. (0.60 m.) in diameter, and with gray bark rather obscurely furrowed by shallow ridges flaking off in thin scales.

*U. S. *Dispensatory*, 16th ed., pp. 1783–4.

Habitat.— Eastern Canada, New Brunswick, Nova Scotia and northeastern United States, southward along the mountains to Virginia, growing in swamps and wet lowlands.

Physical Properties.— Wood moderately soft and heavy, not strong, tough and separating easily between the rings. The heart-wood is abundant and of a darkish brown color, the sap-wood lighter. *Specific Gravity,* 0.6318; *Percentage of Ash,* 0.72; *Relative Approximate Fuel Value,* 0.6273; *Coefficient of Elasticity,* 87185; *Modulus of Rupture,* 806; *Resistance to Longitudinal Pressure,* 423; *Resistance to Indentation,* 194; *Weight of a Cubic Foot in Pounds,* 39.37.

Uses.— A wood of extensive use in the manufacture of furniture and for interior finishing. Another use, and one for which this timber is almost unique in sections where it abounds, is in the manufacture of splint baskets and chair bottoms, an industry largely in the hands of the Indians, or at least commenced by them. For this use the Black Ash is peculiarly qualified owing to the ease with which it splits between the rings of growth. It is worked into sticks as wide *along the rings* as the splints are to be, and perhaps two inches thick. These are then bent sharply in the plane of the radius of the rings when they separate into thin strips, nearly or quite as many as the rings of growth which compose the thickness of the sticks.

Medicinal Properties are not ascribed to this species.

Note.— There are interesting excrescences, sometimes found growing on the trunks of the Black Ash, which deserve mention in this place, and representation in the accompanying sections. I refer to what are popularly known as "burls" or "knots," though the latter name is inappropriate and misleading as they are in no way knots in the common acceptation of the term.

At a certain point on the trunk or a large limb a small, wart-like projection appears, and this continues to grow until in time it may become as large as a caldron kettle or larger. When cut into, it is found to be composed of wood of very much contorted grain through which can be traced innumerable "pins" all radiating approximately from the one starting point in the interior of the trunk. These burls when sliced tangentially (parallel with the bark), as veneers, reveal a very curious figure and are highly ornamental for furniture decoration. They are of such popularity and commercial value that we have introduced in the accompanying sections an extra set (62[a]) to represent the growth.

Order **Moraceæ**:* Mulberry Family.

Leaves simple, alternate, sometimes polymorphous, furnished with usually fugacious stipules. *Flowers* monœcious or diœcious, usually in spikes or heads; calyx 3–5-lobed, becoming fleshy in the fruit, free, imbricated in the bud, or rarely want-

* Moraceæ is ranked by some authors as a sub-order of the order *Urticaceæ*.

ing; corolla wanting; stamens as many as the calyx-lobes and opposite them, or fewer and inserted at their bases, with elastic filaments, inflexed in the bud; ovary free; 1 (or sometimes 2)-celled, containing a single ovule; style filiform, single or 2-parted. *Fruit*, an achenium or drupe enveloped by the succulent calyx and with seed containing fleshy albumen and a curved embryo.

Trees and shrubs with milky and usually noxious or poisonous juice. They are mostly of the tropics and include many interesting trees among which are the Banyan, Fig, Bread-fruit trees, etc.

GENUS MORUS, TOURN.

Leaves rounded, dentate or lobed, 3-veined. *Flowers* dicœcious or monœcious, axillary, inconspicuous, calyx 4-parted; sterile flowers in loose catkins, stamens 4; fertile flowers in dense spikes; ovary 2-celled, one of the cells disappearing; styles 2, filiform, stigmatic on the inner side. *Fruit* a compound, juicy, edible berry composed of the ripened entire spike, the calyx-lobes becoming very fleshy and succulent and enveloping the ovate, compressed achenia.

(*Morus* is the ancient Latin name of the Mulberry).

63. MORUS RUBRA, L.

RED MULBERRY.

Ger., *Rother Maulbeerbaum;* Fr., *Mûrier rouge;* Sp., *Moral colorado.*

SPECIFIC CHARACTERS:— *Leaves* orbicular heart-shaped, 4–6 inches long, thickish, acuminate, serrate (or sometimes lobed on young shoots), rough above, pubescent beneath. *Flowers* often dicœcious, the sterile in pendulous aments about 1 inch in length, and the fertile in small inconspicuous spikes. *Fruit* (ripe in July) is dark red or purple and quite resembling the blackberry. It is of sweet acidulous flavor, quite as agreeable as that of the imported species.

A tree ordinarily of medium size but sometimes attaining the height of 60 or 70 ft. (20 m.), with a trunk 3 or 4 ft. (1 m.) in diameter, with gray, deeply furrowed bark, yellow roots and dense, ample foliage.

HABITAT.—Western New England and westward through southern Ontario to Dakota, and southward to Florida and Texas, most thrifty in the Ohio and Mississippi river valleys.

PHYSICAL PROPERTIES.— Wood rather light and soft, tough, coarse-grained, taking a satiny polish and very durable in contact with the soil. It is of a yellow orange color with very thin whitish sap-wood. *Specific Gravity*, 0.5898; *Percentage of Ash*, 0.71; *Relative Approximate Fuel Value*, 0.5856; *Coefficient of Elasticity*, 82377; *Modulus of Rupture*, 775; *Resistance to Longitudinal Pressure*, 420; *Resistance to Indentation*, 178; *Weight of a Cubic Foot in Pounds*, 36.76.

USES.— Used to considerable extent for fencing, cooperage, etc., and in some sections for boat-building and in the manufacture of agricultural implements.

A valuable ornamental and shade tree, owing to its dense, handsome foliage, while at the same time its fruit is highly esteemed.

MEDICINAL PROPERTIES.— Mulberries are refreshing and laxative, and serve to prepare a grateful drink, well adapted to febrile cases. A syrup is made from their juice and used as an agreeable addition to gargles in inflammation of the throat. They are, however, more used as food than as medicine.*

ORDER **JUGLANDACEÆ**: WALNUT FAMILY.

Leaves alternate, pinnate and without stipules. *Flowers* monœcious and apetalous, except in some cases in the fertile flowers. *Sterile flowers* in catkins with an irregular calyx adnate to the scale of the catkin. *Fertile flowers* solitary or in small clusters, with calyx regularly 3–5-lobed, adherent to the incompletely 2–4-celled, but 1 ovuled ovary. *Fruit* a sort of dry drupe (a tryma), with a fibrous and more or less flesby and coriaceous outer coat (epicarp) very astringent to the taste, a hard, bony inner coat (endocarp), and a 2–4-lobed seed, which is orthotropous, with thick, oily and often corrugated cotyledons and no albumen.

All representatives of the order are trees.

GENUS CARYA, NUTT.†

Leaves odd-pinnate with few leaflets; leaf-buds scaly and from them appear generally both kinds of flowers, the fertile at the extremity of the growth and the sterile at the base, the leaves between. *Sterile flowers* in slender, imbricated, mostly forked catkins; scales 3-parted; calyx mostly 3-parted; stamens 3–10, free, filaments short or wanting and anthers hairy. *Fertile flowers* clustered 2–5 together, their common peduncle terminating the shoot of the season; calyx 4-cleft, superior; petals none; stigmas sessile, 2-lobed, the lobes bifid, papillose, persistent. *Fruit* (October) with a coriaceous but at length dry and hard epicarp (shuck), finally falling away in 4-valves, and a smoothish horny endocarp (shell) with a 2-lobed nucleus.

Trees with hard bark, very tough wood and continuous pith; pubescence stellate.

(*Carya* is the ancient Greek name — *Καρία* — of the Walnut.)

64. CARYA SULCATA, NUTT.‡

THICK SHELL-BARK HICKORY, BIG SHELL-BARK, KING NUT.

Ger., *Gefurchte Hickory;* Fr., *Noyer grand d'Amerique;* Sp., *Nogal surcado.*

SPECIFIC CHARACTERS:—*Leaflets* 7 or 9, oblanceolate, acuminate, all sessile or nearly so, the lowest pair smallest and attenuated to the base, minutely downy beneath; inner bud-scales persisting and growing for a time after the outer have fallen. *Flowers:* — Staminate catkins in threes on a common peduncle at the base of the shoots of the season; middle lobe of calyx at least twice as long as the two lateral broader ones. *Fruit* large, often more than 2 inches long, with thick, woody, 4-valved epicarp, separating to the base along depressed seams; nut 1¼ to 2 in. long, usually longer than broad and pointed at both ends, somewhat flattened and 4-angled, very thick-shelled and with rich, delicious kernel.

(*Sulcata* is the Latin for *ploughed* or *furrowed.*)

A magnificent tree, sometimes attaining 100 ft. (30 m.) in height and 3 or 4 ft. (1 m.) in diameter of trunk, with gray bark, which splits with age into long plates, and these, warping out, give the shaggy or scaly

* *U. S. Dispensatory*, 16th ed., p. 986.
† *Hicoria*, Rafinesque.
‡ *Hicoria sulcata*, (Mill.) Britt.

appearance seen in the bark of the common Shell-bark H., excepting that the strips may be narrower. A common feature, which is conspicuous in winter, is the retention of some of the leaves, which become whipped out in the wind so that only the tough, fibrous stalks remain among the otherwise naked branches.

HABITAT.— New York (sparingly about the lakes in the central region), Pennsylvania and southwestward through the Ohio valley to Kansas and Indian Territory, growing in rich, moist bottom-lands. It is rare and local east of the Alleghanies and reaches its greatest development in the western part of its range.

PHYSICAL PROPERTIES.—Wood heavy, hard, strong, tough and flexible, of a rich brown color with abundant cream-white sap-wood. *Specific Gravity,* 0.8108; *Percentage of Ash,* 0.90; *Relative Approximate Fuel Value,* 0.8035; *Coefficient of Elasticity,* 103884; *Modulus of Rupture,* 1083; *Resistance to Longitudinal Pressure,* 559; *Resistance to Indentation,* 288; *Weight of a Cubic Foot in Pounds,* 50.53.

USES.—This timber, like that of the common Shell-bark H., is of peculiar value in the manufacture of agricultural implements, and particularly the spokes of wheels, axe-helves and tool handles where combined strength and toughness are required.

The delicious nuts of this tree are an important product and always find a ready market.

MEDICINAL PROPERTIES are those common to most if not all of the Hickories. The leaves are somewhat aromatic and astringent, and the bark astringent and bitter. Great advantage has been found from chewing the inner bark in dyspepsia, and a tincture has been used with great success in the treatment of intermittent fever.*

65. CARYA PORCINA, NUTT.*

PIG-NUT HICKORY, BROWN HICKORY, BLACK HICKORY.
Ger., *Ferkelnusz;* Fr., *Noyer de cochon;* Sp., *Nogal de puercos.*

SPECIFIC CHARACTERS:—*Leaflets* 5–7, oblong or obovate-lanceolate, taper-pointed, serrate, nearly or quite smooth both sides, as are also the new shoots and catkins; bud-scales caducous. *Flowers* (March–May):—Staminate catkins in 3s on a common peduncle, at the base of the shoots of the season; lobes of calyx nearly equal in length, the lateral ones broader. *Fruit* quite variable in size and shape, from subspherical to obovate and pear-shape, furnished with fine resinous dots of balsamic odor, with shuck (epicarp) thin, brittle at maturity and 4-valved, the valves not separating freely to the base, nut compressed-globular or compressed-pyriform, smooth or slightly ridged, thick-shelled; kernel variable in flavor, usually sweet at first, but afterward bitter.

(*Porcina* is a Latin adjective signifying *of the pig* and applicable here in allusion to the avidity with which the nuts are devoured by those animals.)

*U. S. *Dispensatory,* 16th ed., p. 1744. † *Hicoria glabra,* (Mill.) Brit.

A large tree attaining the height of 80–100 ft. (26–30 m.) or rarely more, and with a trunk 3–4 ft. (1 m.) in diameter, with dark gray bark which checks with age and becomes somewhat rough, though not exfoliating in long loose strips as with the Shell-bark Hickory.

HABITAT.—From the valley of the St. Lawrence river and southern Ontario southward throughout the eastern United States generally to the gulf, on dry uplands and hill-sides

PHYSICAL PROPERTIES.—Wood very heavy, tough, strong and flexible, with rich brown heart and ample whitish sap-wood. *Specific Gravity,* 0.8217; *Percentage of Ash,* 0.99; *Relative Approximate Fuel Value,* 0.8136; *Coefficient of Elasticity,* 103300; *Modulus of Rupture,* 1046; *Resistance to Longitudinal Pressure,* 577; *Resistance to Indentation,* 301; *Weight of a Cubic Foot in Pounds,* 51.21.

USES.—Like the other Hickories a valuable timber in the manufacture of agricultural implements, wheels, tool-handles, etc., where combined toughness and strength are required.

The nuts of this species are not often gathered owing to their generally inferior flavor, and the difficulty of extracting their meats, though individual trees do sometimes produce nuts of excellent quality.

MEDICINAL PROPERTIES are the same as those noted of the Big Shell-bark Hickory (page 30).

ORDER CUPULIFERÆ: OAK FAMILY.

Leaves alternate, simple, straight-veined; the stipules, forming the bud-scales, deciduous. *Flowers* monœcious, apetalous. *Sterile flowers* in clustered or racemed catkins (or in simple clusters in the Beech); calyx regular or scale-like; stamens 5–20. *Fertile flowers* solitary, clustered or spiked, and furnished with an involucre which forms a cup or covering to the nut; calyx-tube adherent to the ovary, its teeth minute and crowning the summit; ovary 2–7-celled with 1–2 pendulous ovules in each cell, but all of the cells and ovules, except one, disappearing before maturity; stigmas sessile. *Fruit* a 1-celled, 1-seeded nut, solitary or several together, and partly or wholly covered by the scaly (in some cases echinate) involucral cup or covering; seed albumenless, with an anatropous, often edible, embryo; cotyledons thick and fleshy.

Represented by both trees and shrubs.

GENUS QUERCUS L.

Flowers greenish or yellowish. *Sterile flowers* in loose, slender, naked catkins, which spring singly or several together from axillary buds; calyx 2–8-parted or cleft; stamens 3–12; anthers 2-celled. *Fertile flowers* with ovary nearly 3-celled and 6-ovuled, 2 of the cells and 5 of the ovules being abortive; stigma 3-lobed; involucre developing into a hard, scaly cup around the base of the nut or acorn, which is 1-celled and 1-seeded.

(The ancient Latin name for the Oak supposed to be from the Celtic *quer, fine,* and *cuez, tree.*)

66. QUERCUS BICOLOR, WILLD.

SWAMP WHITE OAK.

Ger., *Zweifarbige Eiche;* Fr., *Chêne de Marais;* Sp., *Roble blanco de pantano.*

SPECIFIC CHARACTERS:— *Leaves* obovate or obovate oblong, 5–7 inches in length; wedge-shaped and subentire at base, with large, irregular, obtusely pointed, teeth, or sometimes merely a wavy margin above, and with often a single sinus on each side at the middle, extending half-way to the midrib; smooth and green above, soft-downy and whitish beneath; primary veins 6-8 pairs; petioles very short. *Flowers* with 6–8 stamens; stigmas sessile or nearly so. *Fruit,* acorns maturing the first year, often in pairs, on long peduncles (1–2 inches in length); cup hemispherical with upper scales awn-pointed and sometimes forming a mossy-fringed margin ; nut oblong or ovoid, scarcely 1 inch in length and with eatable kernel.

(*Bicolor* is the Latin for *of two colors,* alluding to the difference in color of the opposite sides of the leaves.)

A large and beautiful tree with ample parti-colored foliage, which when first appearing is of delicate red, brown and light-green, and softly pubescent; later a dark green with whitish under surfaces and in autumn assuming dull yellow and brown tints. In favorable situations it attains the height of 75–100 feet (23–30 m.) and sometimes 5 ft. (1.50 m.) or more in diameter of trunk.

When growing by itself it develops a wide-spreading top with intricate branches, the lowermost of which are often pendulous. The bark of young trees separates into thin, papery scales, but on old trunks becomes rough with longitudinal, scaly ridges, and is then of a pale gray color, very much resembling the bark of the White Oak.

HABITAT.— North-eastern United States from Canada to Virginia, westward to Iowa and Missouri, and southward along the mountains to Georgia, growing in rich bottom-lands along the streams and in swampy woods. It attains its greatest development in the region south of the great lakes.

PHYSICAL PROPERTIES.— Wood heavy, hard, strong and tough, of a light pinkish brown color with whitish sap-wood. *Specific Gravity,* 0.7662; *Percentage of Ash,* 0.58; *Relative Approximate Fuel Value,* 0.7618; *Coefficient of Elasticity,* 90636; *Modulus of Rupture,* 909; *Resistance to Longitudinal Pressure,* 490; *Resistance to Indentation,* 221; *Weight of a Cubic Foot in Pounds,* 47.75.

USES.— The wood of this species is quite as valuable as that of the White Oak (*Q. alba*) from which it is not distinguished in market or in usage. It is employed for many purposes, as for furniture, interior finishing, ship-building, the manufacture of agricultural implements, baskets, in cooperage, etc., and is an excellent fuel.

MEDICINAL PROPERTIES are not known of this species.

NOTE. — Prof. C. S. Sargent mentions 3 m. (nearly 10 feet) as an extreme thickness of trunk which this tree sometimes attains. Such dimensions must certainly be very rare. The following quoted from Prof. Sargent is of special interest as relating to a famous and gigantic tree of this species:

"The greatest Swamp White Oak of which any record has been preserved is known as 'The Wadsworth Oak.' It stood on the intervale of the Genesee river in western New York, on the Wadsworth estate, where many large Swamp Oaks still exist. Mr. S. B. Buckley published, many years ago, a note on this tree in the *American Journal of Science and Arts*, from which it appears that in July, 1851, when he visited it, the trunk varied little in size from the ground to the branches, and that it had an average circumference of twenty-seven feet. Its smallest circumference was twenty-four feet. 'It was situated in a pasture, and the ground was bare and hard beneath it from the tramping of cattle and visitors. The big tree seems fated soon to die.' The prediction, unfortunately, came true, and a few years later this tree, the pride of all the country round, was undermined and washed away by the gradual changing of the bed of the river, near whose banks it had stood for centuries."

67. QUERCUS PRINUS, L.

ROCK OAK, CHESTNUT OAK.

Ger., *Felsen-Eiche;* Fr., *Chêne de roche;* Sp., *Roble de las rocas.*

SPECIFIC CHARACTERS:— *Leaves* varying from obovate to lanceolate and often oblong, acute or acuminate with acute or obtuse base, undulately crenate-toothed, the teeth terminating the 10–16 pairs of straight primary veins, pale and somewhat pubescent beneath; petioles long. *Flowers* with 6–8 stamens; stigmas sessile or nearly so. *Fruit*, acorns maturing the first year, with short peduncles, about ½ in. or less in length (shorter than the petioles) and ovoid nut (often 1 inch in length) with edible kernel, and covered half its length or less by a firm, thin-edged cup, the edges usually flaring out at maturity, composed of small, tubercular, appressed scales.
(*Prinus* is from the ancient Greek πρῖνος, a name applied to a species of Oak.)

A large, handsome tree sometimes attaining the height of 80 ft. (26 m.) or more, and 3 or 4 ft. (1 m.) and sometimes more in diameter of trunk, with leaves considerably resembling those of the chestnut, and a peculiar bluish-gray bark with very prominent rounded and firm ridges. This curious bark is a very striking and characteristic feature.

HABITAT. — North-eastern United States, southern Ontario and southward along the Alleghanies growing on dry, rocky slopes.

PHYSICAL PROPERTIES. — Wood heavy, hard, quite strong and tough, durable in contact with the soil and of a rich brown color with brownish white sap-wood. *Specific Gravity*, 0.7499; *Percentage of Ash*, 0.77; *Relative Approximate Fuel Value*, 0.7441; *Coefficient of Elasticity*,

125473; *Modulus of Rupture*, 1031; *Resistance to Longitudinal Pressure*, 538; *Resistance to Indentation*, 230; *Weight of a Cubic Foot in Pounds*, 46.73.

USES.—A valuable tree both on account of its bark and wood. The latter is put to many of the uses for which the White Oak is employed, and is largely used for fencing, fuel and railroad ties in many localities.

The bark is very rich in tannin, and hence is valuable for tanning purposes.

MEDICINAL PROPERTIES.—The bark of this Oak, in common with that of several other species, is astringent and somewhat tonic, but is not employed as an internal remedy. The decoction may be advantageously used as a bath, particularly for children when a combined tonic and astringent effect is desirable and the stomach is not disposed to receive medicines kindly. It has been employed in this way in marasmus, scrofula, intermittent fevers, chronic diarrhœa and cholera infantum. As an injection in leucorrhœa, as a gargle in slight inflammations of the fauces and as a wash where an astringent action is desired the decoction is often useful.*

NOTE.—Owing to the tenacity with which this tree takes root and flourishes on rough, rocky hill-sides, and its great utility to man, it is doubtless destined to be an important tree in the future for the re-forestation of such tracts when the natural timber supply shall have been exhausted. Those having such land could not, we would think, put it to better use than to strew it with acorns of this species. Nature would do the rest, but the young trees should be protected from cattle and fires, and in time a bounteous return for the little labor and expense would be the result.

68. QUERCUS MUHLENBERGII, ENGELM.

CHINQUAPIN OAK, CHESTNUT OAK, YELLOW OAK

Ger., *Kostanien-Eiche ;* Fr., *Chêne jaune ;* Sp., *Roble amarillo.*

SPECIFIC CHARACTERS:—*Leaves* varying from lanceolate to oblong and obovate, usually taper-pointed and acute (sometimes roundish) at base, coarsely and rather equally undulate-toothed, the teeth quite sharp and terminating the 6–12 pairs of straight, prominent, primary veins, glaucous-hoary beneath; petioles long and rather slender, with 6–8 stamens; stigmas sessile or nearly so. *Fruit*, acorns maturing the first year, nearly sessile, with shallow, thinnish cup, composed of small, not very closely appressed scales, and covering about one-third of the roundish-ovoid nut, which is ¾ in. or less in length; kernel sweet and edible.

☞There is a dwarf oak closely resembling this, excepting in being a shrub, having leaves with shorter petioles, etc. By some authors it is ranked as identical with this, as being merely a dwarf form, and the name *Q. prinoides*, Willd., is given to include both the shrub and the tree. By other authors they are considered as distinct, and *Q. prinoides* applies to the shrub only.

* *U. S. Dispensatory*, 16th ed., p. 1261.

A fine tree, with leaf more closely resembling that of the Chestnut than does any other Oak. It sometimes attains the dimensions of 80 ft. (26 m.) in height and 3 or 4 ft. (1 m.) in diameter of trunk, with whitish-gray bark cleft into narrow, flaky ridges, very much resembling the bark of the White Oak.

HABITAT.— Massachusetts, central New York and westward to Minnesota and eastern Nebraska; southward along the Alleghanies to northern Alabama and west of the Mississippi river to Texas.

PHYSICAL PROPERTIES.—Wood heavy, hard, strong and durable in contact with the soil. It is of a rich, light-brown color with whitish sapwood. *Specific Gravity,* 0.8605; *Percentage of Ash,* 0.84; *Relative Approximate Fuel Value,* 0.8507; *Coefficient of Elasticity,* 112461; *Modulus of Rupture,* 1238; *Resistance to Longitudinal Pressure,* 575; *Resistance to Indentation,* 264; *Weight of a Cubic Foot in Pounds,* 53.63.

USES.—A valuable timber for cooperage, furniture, agricultural implements, railway ties, fencing, fuel, etc.

MEDICINAL PROPERTIES are not recorded of this species.

69. QUERCUS COCCINEA, WANG.

SCARLET OAK.

Ger., *Scharlach Eiche;* Fr., *Chêne écarlate;* Sp., *Roble colorado.*

SPECIFIC CHARACTERS:—*Leaves* oval or oblong, deeply pinnatifid, more or less truncate at base, with slender, divaricate, and sparingly cut-toothed lobes, the teeth conspicuously bristle-pointed, sinuses 3 or 4 on each side, broad and rounded at base, bright green and smooth both sides, shining above; petioles long and slender; buds small. *Flowers* with 4–6 stamens; styles long and spreading. *Fruit,* acorns maturing the second year, ½ to 1 inch in length, sessile or nearly so, with turbinate cup composed of coarse, thin, somewhat appressed scales and half covering the short globular-ovoid nut.

(*Coccinea* is the Latin for *scarlet.*)

The Scarlet Oak attains the height of 100 ft. (30 m.) or more, and sometimes 4 ft. (1.20 m.) in diameter of trunk. It is a handsome tree at all seasons of the year when bearing its light, airy foliage, but particularly so in autumn when the leaves assume a scarlet or light-red color, easily distinguishable from the darker reds, browns and purple of the other oaks. The bark is externally of a dark-gray color cleft with age into rather broad, shallow and firmly adherent ridges which are quite smooth and blotched with whitish along their centers. The bark within is of a distinctly reddish or pink color.

HABITAT.—From southern Maine westward to Iowa, southward to Delaware and among the mountains to northern Florida.

PHYSICAL PROPERTIES.—Wood heavy, hard and strong, of a pinkish-brown color with rather scant, whitish sap-wood. *Specific Gravity*, 0.7405; *Percentage of Ash*, 0.19; *Relative Approximate Fuel Value*, 0.7391; *Coefficient of Elasticity*, 108507; *Modulus of Rupture*, 1054; *Resistance to Longitudinal Pressure*, 504; *Resistance to Indentation*, 202; *Weight of a Cubic Foot in Pounds*, 46.15.

USES.—This is not a particularly valuable timber and is not distinguished in usage from the Red Oak and other allied species. It is used in cooperage, for chairs, etc., and to some extent in interior finishing. As a fuel it is of rather inferior grade. The bark is sometimes used for tanning purposes.

MEDICINAL PROPERTIES.—None are known of this species.

ORDER **BETULACEÆ**: BIRCH FAMILY.

Leaves simple, alternate, straight-veined and furnished with stipules which fall away early. *Flowers* mostly naked, monœcious, both kinds in catkins, 2 or 3 together under a 3-lobed bract or scale. *Sterile flowers* with distinct stamens and 2-celled anthers. *Fertile flowers* with two thread-like stigmas, and a 2-celled ovary, each cell containing 2 pendulous ovules, becoming by abortion in *Fruit*, a small, 1-celled, 1-seeded nutlet, often with membranous wings; seed anatropous, albumenless, with flattish, oblong cotyledons which become foliaceous in germination.

Trees or shrubs, with bark which separates more or less easily into thin layers.

GENUS BETULA, TOURN.

Leaves ovate, serrate, these, with the twigs, especially the latter, spicy-aromatic. *Flowers* appearing in early spring with or before the leaves. *Sterile flowers* in long drooping, cylindrical, both terminal and lateral, yellow catkins, appearing in summer and remaining dormant during the following winter to open and perform their function early the next season; bracts 3-lobed, shield-shaped, and beneath each are 2 bractlets and 3 flowers, with calyx represented by a mere scale, which bears the 4 short stamens, each with a single-celled anther. *Fertile flowers* in cylindrical or oblong catkins with 3-lobed scales, and beneath each scale are 2–3 naked pistils without bractlets or calyx. *Fruit* a small, broadly-winged, scale-like nutlet or samara.

Trees and shrubs with outer bark horizontally fibrous and usually separable in sheets, that of the branchlets dotted, inner bark more or less aromatic and of pleasant flavor.

70. BETULA POPULIFOLIA, MARSHALL.

WHITE BIRCH, POPLAR-LEAVED BIRCH, OLD-FIELD BIRCH.

Ger., *Pappelblättrige Birke;* Fr., *Bouleau blanc;* Sp., *Abedul blanco.*

SPECIFIC CHARACTERS:—*Leaves* deltoid with long tapering point, more or less truncate at base, unequally serrate or obscurely lobed, smooth and shining both sides, resinous dotted when young, of firm texture and with long, slender and smooth petioles. *Fruit* in cylindrical, pendulous catkins, an inch or more in length, with long slender peduncles; scales glabrous, with short, roundish, diverging lobes, and falling away freely when mature; wing of nutlet much broader than its body.

(*Populifolia* is from Lat. *populus, poplar*, and *folium, leaf*, alluding to the resemblance of the leaves to those of the poplar.)

A small and graceful tree attaining the height of 30 ft. (9 m.), or rarely more, with a trunk not often 15 in. (0.45 m.) in diameter, clothed with a smooth, chalky-white bark, which separates with some difficulty into thin sheets and peels off around the tree. Its branches are numerous, slender and upright at first, but with drooping sprays of a purplish-brown color. The foliage is rather thin and always agitated by the slightest wind like that of the poplar, owing to the length of its slender petioles.

Habitat.— New Brunswick, the valley of the St. Lawrence and southward to Delaware, thriving in dry and very poor, sandy soil.

Physical Properties.— Wood light, soft, not strong, fine-grained and taking a fine satiny polish. It is of a light-brown color with brownish-white sap-wood. *Specific Gravity*, 0.5760; *Percentage of Ash*, 0.29; *Relative Approximate Fuel Value*, 0.5743; *Coefficient of Elasticity*, 72970; *Modulus of Rupture*, 778; *Resistance to Longitudinal Pressure*, 348; *Resistance to Indentation*, 129; *Weight of a Cubic Foot in Pounds*, 35.90.

Uses.— Valuable in the manufacture of small wooden-ware, as clothes-pins, spools, shoe pegs, tooth-picks, etc.. and is used to some extent for paper-pulp and fuel.

Medicinal Properties are not officinally recognized of this species.

Order SALICACEÆ: Willow Family.

Leaves alternate, simple, undivided and furnished with stipules, which are either scale-like and deciduous, or leaf-like and persistent. *Flowers* diœcious, both kinds in catkins, one under each bract or scale of the catkin, and destitute of both calyx and corolla, or the former represented by a gland-like cup; ovary 1 to 2-celled; styles wanting, or 2 and short; stigmas often 2-lobed. *Fruit* a 1 or 2-celled, 2-valved pod, with numerous seeds springing from 2 parietal or basal placentæ and furnished with long, silky down; seeds ascending, anatropous, without albumen; cotyledons flat.

Trees or shrubs of rapid growth, light wood and bitter bark.

Genus SALIX, Tourn.

Leaves generally narrow, long and pointed and usually with conspicuous stipules; bud scales single. *Flowers* appearing before or with the leaves in terminal and lateral cylindrical, imbricated catkins, the scales or bracts of which are entire and each subtending a flower, which is without calyx, and bears at its base 1 or 2 small nectiferous glands. *Sterile flowers* with 2 (but sometimes more) distinct or united stamens. *Fertile flowers* :—ovary ovoid lanceolate, taper-pointed; style short; stigmas 2, short and mostly bifid. *Fruit* a 1-celled pod, dehiscent at maturity by two valves which roll back at the summit to liberate the numerous minute comose seeds.

Trees and shrubs with lithe round branches and growing mostly along streams and in moist localities. (*Salix* is from the Celtic *sal*, *near* and *lis*, *water*, alluding to the favorite locality of the willows.)

71. SALIX AMYGDALOIDES, ANDERS.

PEACH WILLOW, PEACH-LEAVED WILLOW.

Ger., *Mandel-Weide;* Fr., *Saule de feuilles de peche;* Sp., *Sauce de hojas de almendra.*

SPECIFIC CHARACTERS:— *Leaves* lanceolate or ovate lanceolate, 2–4 inches in length, with long tapering point, pale glaucous beneath, closely serrate; petioles long and slender; stipules minute and caducous. *Flowers* rather remotely subverticillate in the aments, which are leafy-peduncled, long-cylindrical and pendulous; scales of the fertile ament are crisp-villous inside and fall away early; style short or obsolete; stigmas notched; scales of the sterile ament broader, ovate and crisp-villous. *Fruit,* capsules, globose-conical, glabrous, long-pediceled, the ament bearing them having become at maturity lax and 3–4 in. long, ½ in. thick.

(*Amygdaloides* is from the Greek αμυγδάλη, the *almond,* and εἶδος, *appearance,* alluding to the resemblance in the leaves to those of the almond.)

This willow rarely attains a greater size than 40 ft. (12 m.) in height and 1 ft. (0.30 m.) in diameter of trunk. Its bark is of a gray color, rough with large, scaly, and loosely adherent ridges, very much resembling the bark of the Black Willow. Its broad leaves as they flutter in the wind and show successively their rich green upper surfaces and whitish under surfaces give the tree a handsome and striking aspect.

HABITAT.— Central New York and westward to the Rocky Mountains; more common in the west where it ranges from beyond our northern border southward into New Mexico.

PHYSICAL PROPERTIES.—Wood light, soft, not strong, close-grained and of cottony fiber. It is of a reddish-brown color with nearly white sap-wood. *Specific Gravity,* 0.4509 ; *Percentage of Ash,* 0.92; *Relative Approximate Fuel Value,* 0.4468; *Coefficient of Elasticity,* 50144; *Modulus of Rupture,* 550; *Resistance to Longitudinal Pressure,* 264; *Resistance to Indentation,* 81; *Weight of a Cubic Foot in Pounds,* 28.10.

USES.— Not generally known in commerce though the wood would doubtless make excellent charcoal, and its cotton-like fiber would suggest its value for paper pulp, though I am not aware that it has ever been put to this use.

MEDICINAL PROPERTIES which are common to the genus are found in the bark and are readily yielded to water. A decoction of this is astringent and feebly tonic and used as a febrifuge in domestic practice. The active principle is *salicin,* and it has been efficacious in the treatment of rheumatism, and as an antiperiodic it appears to possess some controlling influence over malarial disorders. Salicylic acid — very valuable in medicine and the arts — can be derived from salicin, but at an expense so much greater than with other known sources as to be impracticable.*

* *U. S. Dispensary,* 16th ed., p. 1316.

GENUS POPULUS, TOURN.

Leaves broad, more or less heart-shaped or ovate, and petioles which are long and often vertically compressed. *Flowers* appearing before the leaves in long, drooping, lateral, cylindrical catkins, the scales of which are furnished with a fringed margin; calyx represented by an oblique, cup-shaped disk with entire margin; stamens 8–30 or more, with distinct filaments; pistil with very short, bifid style, and large, 2-lobed stigma. *Fruit* as described for the order.

Represented by rather large trees. (A Latin word, meaning *the people*, and applicable either from the fact that these trees are often set along public walks, or in allusion to the tremulous leaves which are in constant agitation like a crowd of people.)

72. POPULUS TREMULOIDES, MICHX.

QUAKING ASP, ASPEN.

Ger., *Amerikanische Zitter-Espe;* Fr., *Le Tremble d'Amerique;* Sp., *Alamo tremblon.*

SPECIFIC CHARACTERS:— *Leaves* ovate-orbicular, with a short, sharp apex, small, the blade being usually not over 2 inches in length and of about equal width; serrate, smooth both sides; margins pubescent, petioles 2–3 inches long, slender and laterally compressed; branchlets terete. *Flowers* appear in April (before the leaves) in hairy aments; stamens 6–20; styles 2, bearing 2–3 narrow lobes; scales 3–4-cleft and fringed with long hairs. *Fruit* small oblong-conical, thin-shelled and 2-valved capsules, borne in pendulous aments; seeds very small.

(*Tremuloides* is from the Lat. *tremula* — from *tremo, I shake* — the specific name of a European species, and the Gk., *εἶδος, appearance,* designating a resemblance to that species.)

A small tree, rarely attaining 60 ft. (18 m.) in height and 2 ft. (0.60 m.) in thickness of trunk, with smooth, pale clay-colored bark, which on old trunks checks into rough, grayish-black ridges. Owing to the laterally compressed nature of the slender petioles, the leaves are in constant agitation, moved by the slightest breeze. This is a trait more or less common to all of the Poplars, but in no species is it as well marked as in this.

HABITAT.—This is considered the most widely distributed of North American trees. It is found throughout British America from Labrador and Newfoundland to Alaska, southward into Pennsylvania and Kentucky in the east and to central California in the west, and among the mountains to New Mexico and Arizona.

PHYSICAL PROPERTIES.—Wood light, soft, not strong, close-grained, of cottony fiber and soon decaying when in contact with the soil. It is of a light-brown color with thick, nearly white, sap-wood. *Specific Gravity,* 0.4032; *Percentage of Ash,* 0.55; *Relative Approximate Fuel Value,* 0.4010; *Coefficient of Elasticity,* 81441; *Modulus of Rupture,* 677; *Resistance to Longitudinal Pressure,* 330; *Resistance to Indentation,* 80; *Weight of a Cubic Foot in Pounds,* 25.13.

USES.—A valuable wood for paper-pulp, small wooden-ware, turnery, and is used to some small extent for lumber.

MEDICINAL PROPERTIES.—The bark of this species possesses tonic properties, and has been used in intermittent fever with advantage.*

73. POPULUS DILATATA, AIT.

LOMBARDY POPLAR.

Ger., *Pyramiden-Pappel;* Fr., *Peuplier pyramidal;* Sp., *Alamo de Italia.*

SPECIFIC CHARACTERS:—*Leaves* deltoid, the breadth equaling the length or greater, serrate, moderately acuminate, smooth; buds furnished with a balsamic, aromatic resin. *Flowers* in aments without hairs.

(*Dilatata* is from the Lat. *dilato*, to *extend* or *widen*, alluding to the breadth of leaves.)

An interesting tree, distinguishable from all other deciduous trees by its closely appressed branches, making a spire-shaped top. It sometimes surpasses 100 ft. in height with a trunk 3 or 4 ft. (1 m.) or more in diameter, furnished with deep buttresses, and clothed in gray, roughly furrowed bark.

HABITAT.—The native country is thought to be southern Europe, and particularly that portion of Italy from which it takes its name. It is found, however, in Persia and among the Himalaya mountains, and hence may have been early introduced into Europe from the East. It was formerly extensively planted throughout Europe and in this country as an ornamental tree. We now find it growing apparently spontaneously in places, and particularly along lake-shores, where floating branches must have been deposited and taken root.

PHYSICAL PROPERTIES.—Wood light, soft, not strong, close-grained and taking a satiny finish. It is of a reddish-brown color with thick sap-wood nearly white.

USES.—Although the wood of this species makes excellent lumber, clear white and easily worked, it is seldom used. The trunks are usually short and the species nowhere enough abundant to give the timber a place in market. It would doubtless be valuable in turnery and for paper-pulp. It is a useful tree for wind-breaks and screens, owing to its rapidity of growth and density of top.

For ornamental purposes the tree has a value peculiarly its own, no other tree being so well suited as this in its particular place, as when tastefully grouped with low, round-topped trees, to remove the monotony of a level, featureless landscape.

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* *U. S. Dispensatory*, 16th ed., p. 1897.

NOTE.—This tree is generally considered a variety or monstrosity of the Black Poplar (*P. nigra*) of Europe, all the existing specimens having come from a certain one or few individuals in the remote past and reproduced by cuttings. The tree is of short life, and especially of late years seems to be of more and more feeble constitution. This is thought by some to be only the natural degeneration or decline which comes from lack of cross-fertilizing influence, and that the time is not far distant when it will become extinct, unless new individual sprouts should happen to appear to revitalize the race.

GYMNOSPERMÆ.

Flowering, exogenous plants with *leaves* chiefly parallel-veined and cotyledons frequently more than two. *Flowers* diclinous and very incomplete; pistil represented by an open scale or leaf, or altogether wanting, with ovules naked, fertilized by direct contact with the pollen, and seeds at maturity naked — without a true pericarp.

ORDER CONIFERÆ: PINE FAMILY.

Leaves mostly awl-shaped or needle-shaped, evergreen, entire and paralled-veined. *Flowers* monœcious, or rarely diœcious, in catkins or cones, destitute of both calyx and corolla; stamens one or several (usually united); ovary, style and stigma wanting; ovules one or several at the base of a scale, which serves as a carpel, or on an open disk. *Fruit* a cone, woody and with distinct scales, or somewhat berry-like, and with fleshy coherent scales; seeds orthotropous, embryo in the axis of the albumen.

Trees or shrubs with a resinous juice.

GENUS CHAMAECYPARIS, SPACH.

Leaves evergreen, very small, scale-like, imbricated and closely appressed, or on vigorous shoots awl-shaped and free; leaf-buds not scaly; branchlets distichous and finely divided. *Flowers* monœcious, in small, terminal, few-flowered catkins. Sterile catkins ovoid, with filaments in the form of shield-shaped scales, each bearing beneath its lower margin 2–4 anther-cells, opening lengthwise. Fertile catkins globose with shield-shaped scales decussate, each bearing at its base several bottle-shaped, orthotropous ovules. *Fruit* a small, spherical cone, the thick, shield-shaped scales of which are furnished with a point or boss in the center, and fit closely together along their margins until maturity, when they open and liberate their angled or somewhat winged seeds; cotyledons 2–3.

(*Chamaecyparis* is from the Greek χαμαι, *on the ground*, and κυπάρισσος, *cypress*.)

74. CHAMAECYPARIS THYOIDES, L.*

WHITE CEDAR.

Ger., *Weisze Zeder;* Fr., *Cedre blanc;* Sp., *Cedro blanco.*

SPECIFIC CHARACTERS:— *Leaves* pale glaucous-green, minute, triangular awl-shaped or ovate, and each furnished with a gland or tubercle on its back, imbricated in 4 rows and covering the finely divided branchlets. *Cones* small, spherical, about ¼ in. in diameter, of about three pairs of scales and with slightly winged seeds.

**Chamaecyparis sphaeroidea*, Spach.

(*Thyoides* is from *Thuya*, the generic name of the Arbor-Vitæ, and *εἶδος*, *resemblance.*)

A graceful, handsome tree, sometimes attaining the height of 80 ft. (24 m.) with a trunk 3 or 4 feet (1 m.) or more in diameter, covered with a reddish-brown bark which checks and peels off lengthwise in thin strips, giving to old trunks a ragged, shaggy appearance.

HABITAT.— Along the coast from Maine to Florida and thence westward to Mississippi, growing principally in swamps, where it is sometimes the exclusive timber and growing so densely as to be almost impenetrable.

PHYSICAL PROPERTIES.— Wood very light, soft, not strong, close-grained and very durable in contact with the soil. Of a light pinkish-brown color when fresh, but growing darker in time, and with lighter sap-wood. It is of pleasant odor, very much resembling, when freshly cut, that of the red cedar. *Specific Gravity*, 0.3322; *Percentage of Ash*, 0.33; *Relative Approximate Fuel Value*, 0.3311; *Coefficient of Elasticity*, 40410; *Modulus of Rupture*, 456; *Resistance to Longitudinal Pressure*, 259; *Resistance to Indentation.* 67; *Weight of a Cubic Foot in Pounds*, 20.70.

USES.— A very valuable timber for shingles, wooden-ware, cooperage, siding for small boats, posts, railway ties, fencing, etc. Posts of this timber are said to last sometimes half a century. The wood also makes excellent lampblack and charcoal.

MEDICINAL PROPERTIES.— None are officinally recognized of this species.

GENUS PINUS, TOURN.

Leaves evergreen, needle-shaped, from slender buds, in clusters of 2–5 together, each cluster invested at its base with a sheath of thin, membraneous scales. *Flowers* appearing in spring, monœcious. *Sterile flowers* in catkins, clustered at the base of the shoots of the season; stamens numerous with very short filaments and a scale-like connective; anther cells 2, opening lengthwise; pollen grains triple. *Fertile flowers* in conical or cylindrical spikes — cones — consisting of imbricated, carpellary scales, each in the axil of a persistent bract and bearing at its base within a pair of inverted ovules. *Fruit* maturing in the autumn of the second year, a cone formed of the imbricated carpellary scales, which are woody, often thickened or awned at the apex, persistent, when ripe dry and spreading to liberate the two, nut-like, winged seeds; cotyledons 3–12, linear.

(*Pinus* is a Latin word from Celtic *pin* or *pen*, *a crag.*)

75. PINUS MITIS, MICHX.*

SHORT-LEAF PINE, YELLOW PINE, SPRUCE PINE.

Ger., *Kurznadelige Fichte;* Fr., *Pin de feuilles courtes;* Sp., *Pino con hojas certas.*

SPECIFIC CHARACTERS:— *Leaves* in twos (or exceptionally in threes) slender, mostly 3–5 inches long and with close, elongated sheathes, about ¼ inch in length. *Cones* ovoid or oblong, scarcely 2 inches in length (which is about twice the width) with short peduncles, borne laterally and usually singly or in pairs; scales thickened at the end and furnished with a small, weak prickle, which in the young and closed cones projects nearly at right-angles to the axis of the cone.

(*Mitis* is the Latin for *mild, soft*, doubtless in allusion to the weak, deciduous nature of the prickles or perhaps to the delicate, soft nature of the foliage as compared with some of the other pines.)

A tree of straight habit of growth, sometimes attaining the height of 80 ft. (24 m.) or more and 3 or 4 ft. (1 m.) in diameter of trunk, with rather spreading top and scant foliage. It is distinguishable by its small cones and reddish bark which checks at maturity into broad irregular ridges or patches and flakes away in time in thin scales. It is moderately supplied with pitch.

HABITAT.—A tree of wide distribution being found from south-eastern New York and Connecticut southward to Florida and westward to Kansas and Texas, growing usually on dry, sandy uplands. It is most abundant in north-eastern Texas and the adjoining regions of Louisiana, Arkansas and Indian Territory.

PHYSICAL PROPERTIES.—Wood rather heavy, hard, coarse-grained, compact and comparatively easily worked; of a light orange color with lighter sap-wood. *Specific Gravity,* 0.6104; *Percentage of Ash,* 0.29; *Relative Approximate Fuel Value,* 0.6086; *Coefficient of Elasticity,* 137495; *Modulus of Rupture,* 1038; *Resistance to Longitudinal Pressure,* 477; *Resistance to Indentation,* 129; *Weight of a Cubic Foot in Pounds,* 38.04.

USES.—Extensively employed for lumber for general building purposes, interior finishing, flowering, etc. Considerable resin and turpentine are derived from this tree.

MEDICINAL PROPERTIES are not claimed of this tree excepting those found in the turpentine, etc., derived from it.

**Pinus echinata,* Miller.

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51. MAGNOLIA GLAUCA. L.

Sweet Bay, Small Magnolia, White or Swamp Laurel, Beaver-Tree.

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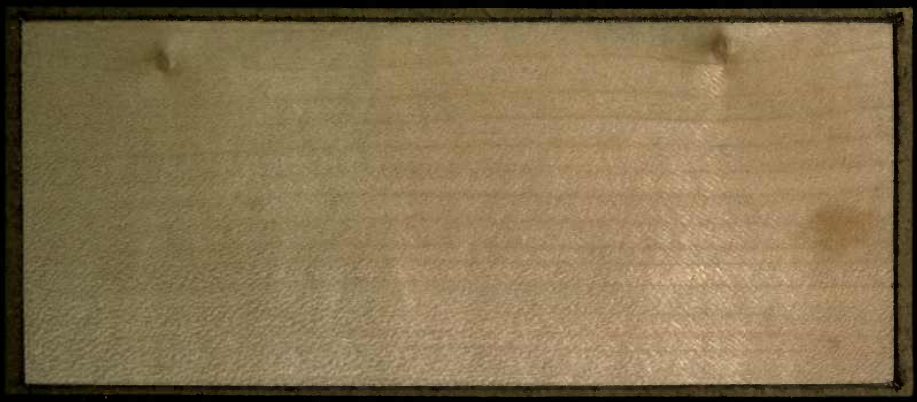

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Grauer Biberbaum. Sp. Laurel dulce.

Fr. Magnolier glauque.

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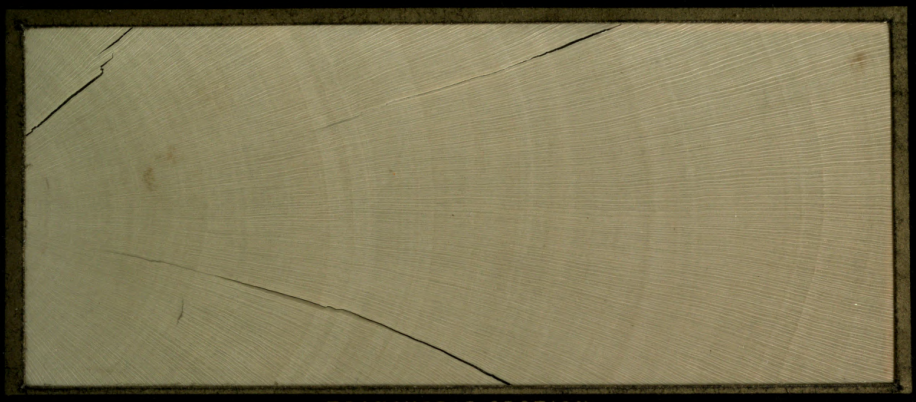
52. ILEX OPACA, AIT.

American Holly.



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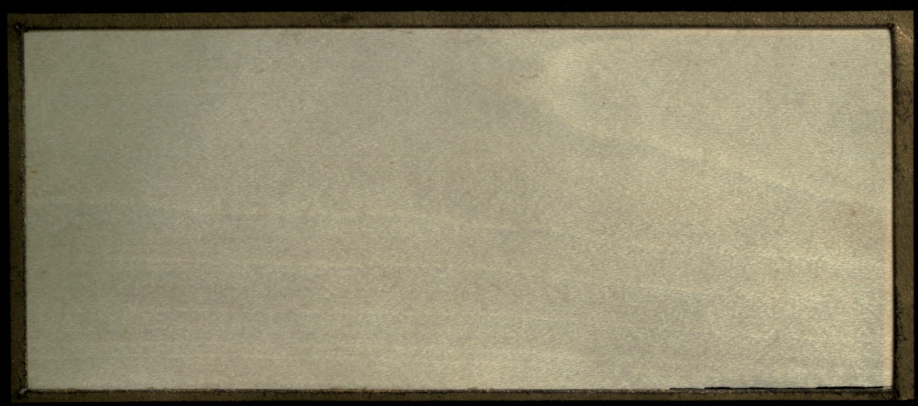

TANGENTIAL SECTION

Ger. Amerikanische Steckpalme. Sp. Acebo Americano.

Fr. Houx de l'Amerique.

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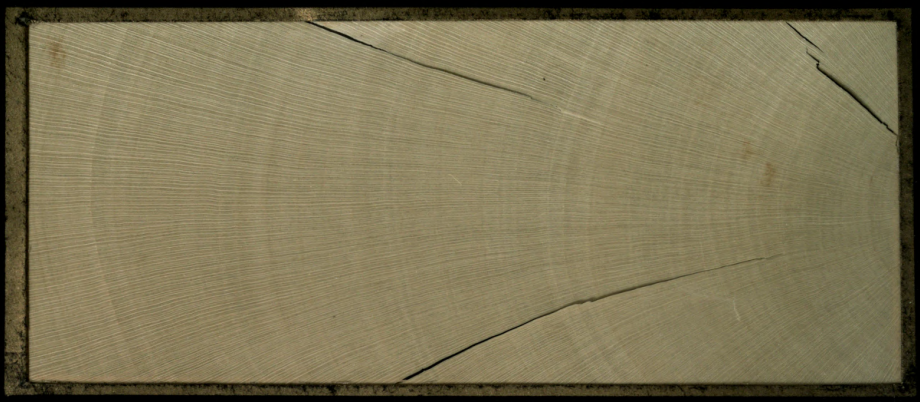

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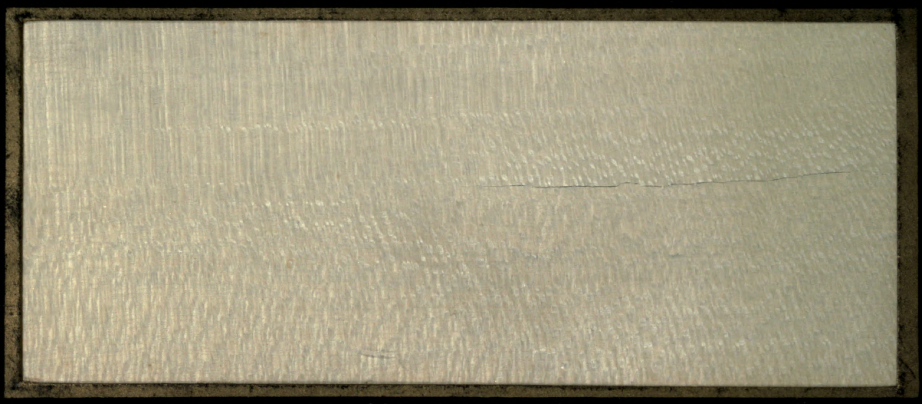

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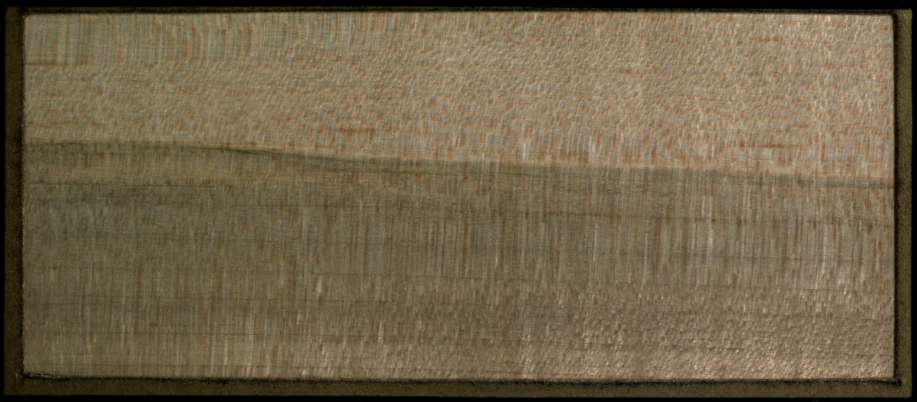
53. ACER RUBRUM, L.

Red Maple, Swamp Maple, Soft Maple, Red-flowered Maple.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Rother Ahorn. Sp. Arce rojo.

Fr. Erable rouge.

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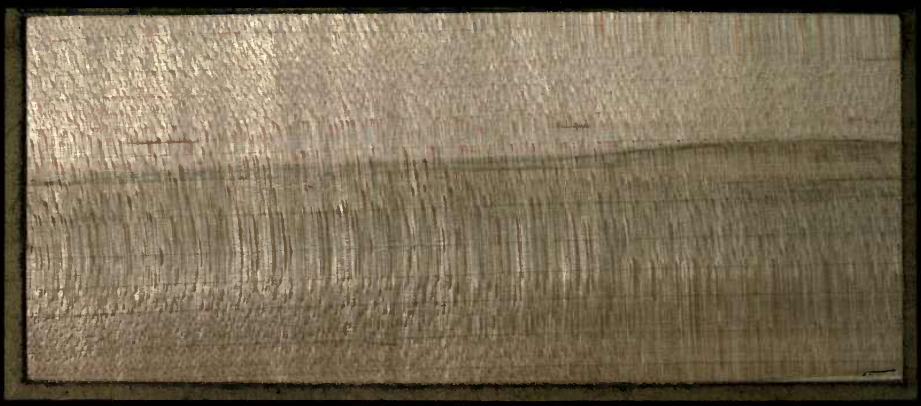

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TANGENTIAL SECTION

Ger. Rother Ahorn. Sp. Arce rojo.

Fr. Erable rouge.

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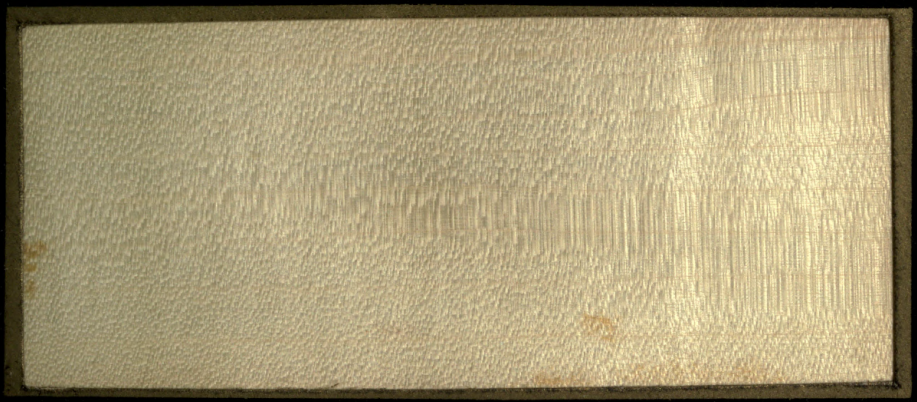
54. ACER NEGUNDO, L.

Box-Elder, Ash-leaved Maple, Negundo.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Eschenblättriger Ahorn. Sp. Negundo de Arce.

Fr. Erable à feuilles de frène.

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54. ACER NEGUNDO, L.

Box-Elder, Ash-leaved Maple, Negundo.

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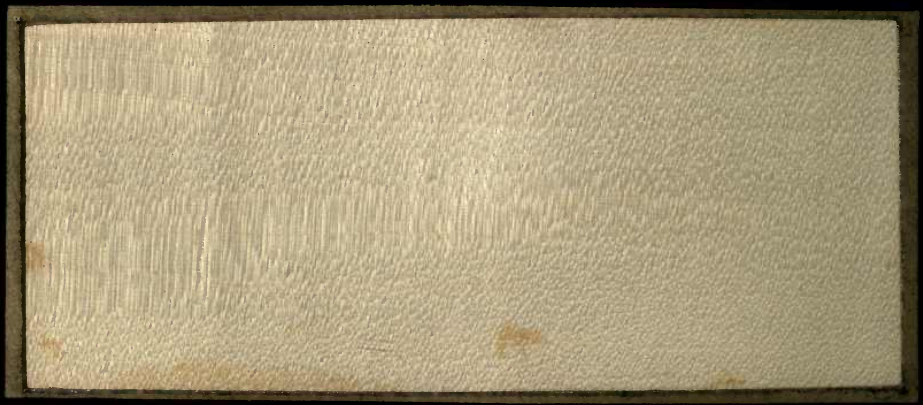

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TANGENTIAL SECTION

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Fr. Erable à feuilles de frêne.

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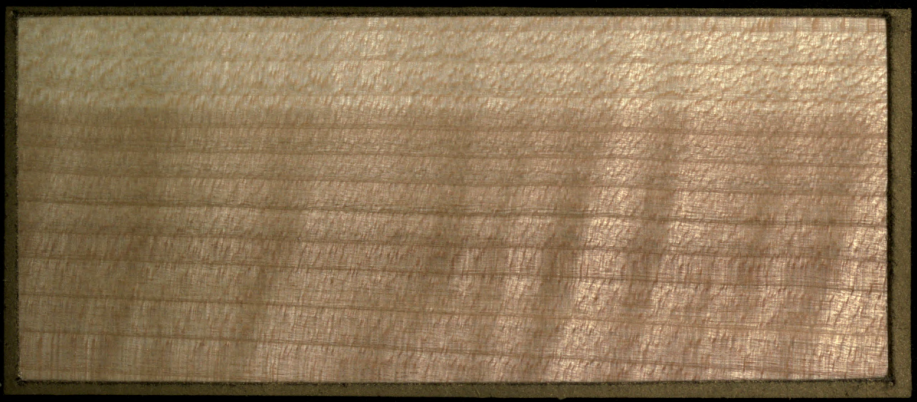
55. PRUNUS PENNSYLVANIA, L. F.

Wild Red Cherry, Pigeon Cherry, Pin Cherry, Bird Cherry.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Tauben-Kirsche. *Sp.* Cerezo de paloma.

Fr. Cerisier du pigeon.

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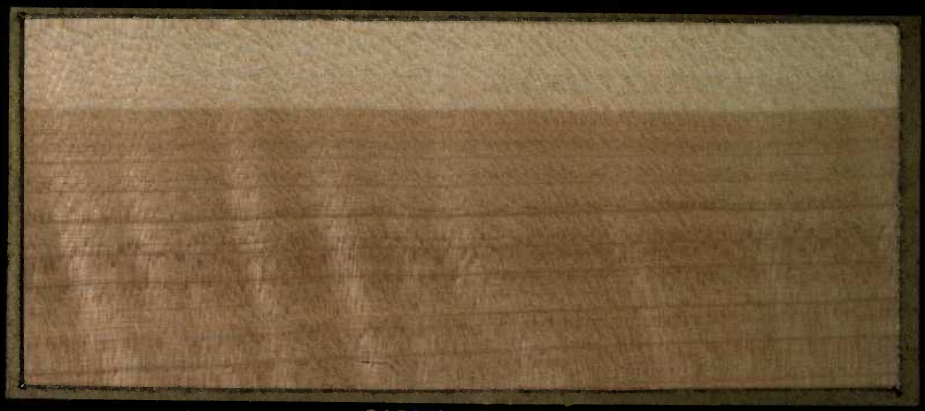
TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

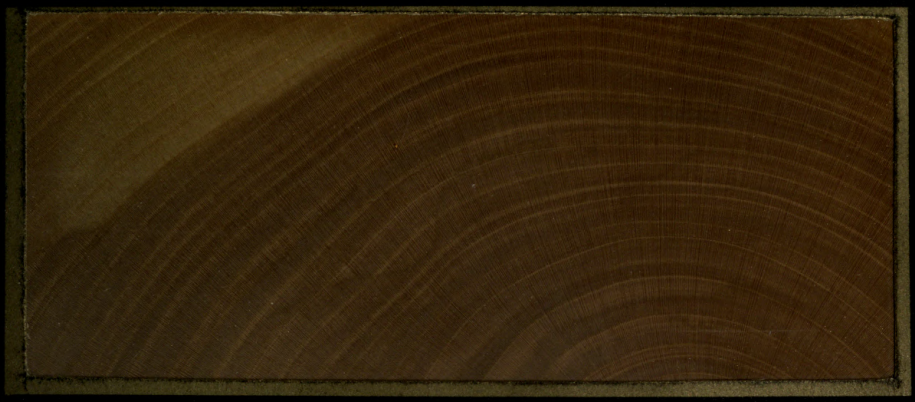
Ger. Tauben-Kirsche. *Sp.* Cerezo de paloma.

Fr. Cerisier du pigeon.

Published and Sections made by Romeyn B. Hough, B. A., Lowville N. Y., U. S. A.

56. PRUNUS AVIUM, L.

Ox-heart Cherry, English Cherry.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Susser Kirschbaum. *Sp.* Cerezo.

Fr. Mérisier.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

56. PRUNUS AVIUM, L.

Ox-heart Cherry, English Cherry.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Susser Kirschbaum. Sp. Cerezo.

Fr. Mérisier.

Published and Sections made by Romeyn B. Hough, R. A., Lowville, N. Y., U. S. A.

57. PYRUS COMMUNIS, L.

Pear.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Birnbaum. Sp. Peral.

Fr. Poirier commun.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

57. PYRUS COMMUNIS, L.

Pear.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

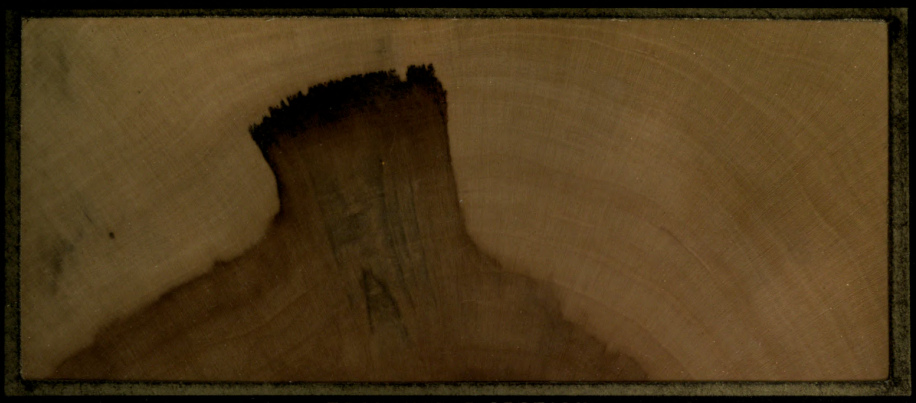
Ger. Birnbaum. Sp. Peral.

Fr. Poirier commun.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

58. CRATAEGUS PUNCTATA, JACQ.

Dotted-fruited Thorn, Thorn-apple.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Geflecte Mispel. Sp. Espino puntuado.

Fr. Néflier à fruits pointillés.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

58. CRATAEGUS PUNCTATA, JACQ.

Dotted-fruited Thorn, Thorn-apple.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Geflecte Mispel. Sp. Espino puntuado.

Fr. Néflier à fruits pointillés.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

59. AMELANCHIER CANADENSIS, TORR AND GRAY.

June-berry, Service-tree, Shad-bush, Shad-blow.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

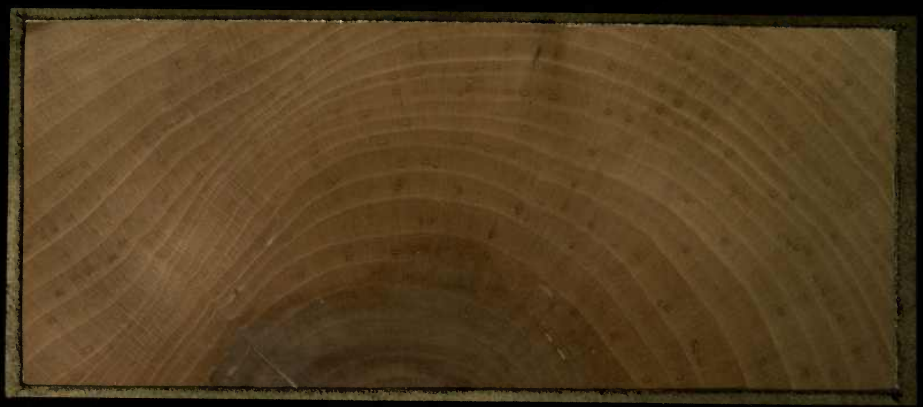
Ger. Gewohnliche Traubenbirne. *Sp.* Nispero.

Fr. Grand Amelanchier.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

59. AMELANCHIER CANADENSIS, TORR AND GRAY.

June-berry, Service-tree, Shad-bush, Shad-blow.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Gewohnliche Traubenbirne. Sp. Nispero.

Fr. Grand Amelanchier.

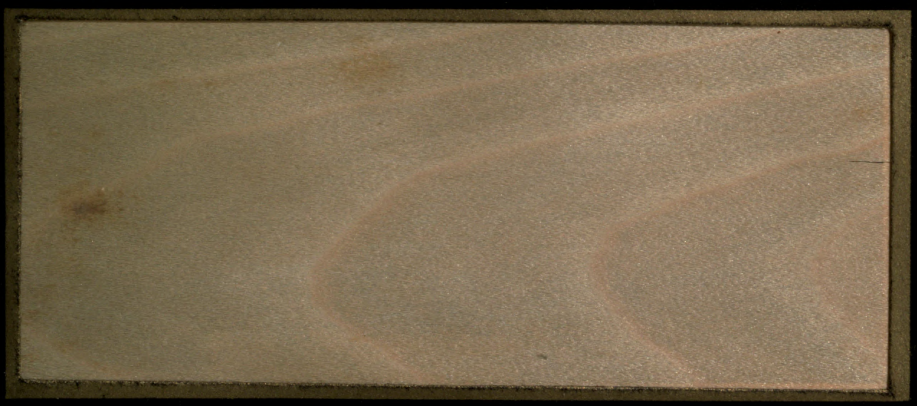
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

60. LIQUIDAMBAR STYRACIFLUA, L.

Sweet Gum, Bilsted, Red Gum.

TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION

Ger. Storaxbaum. Sp. Liquidambar.

Fr. Copalm.

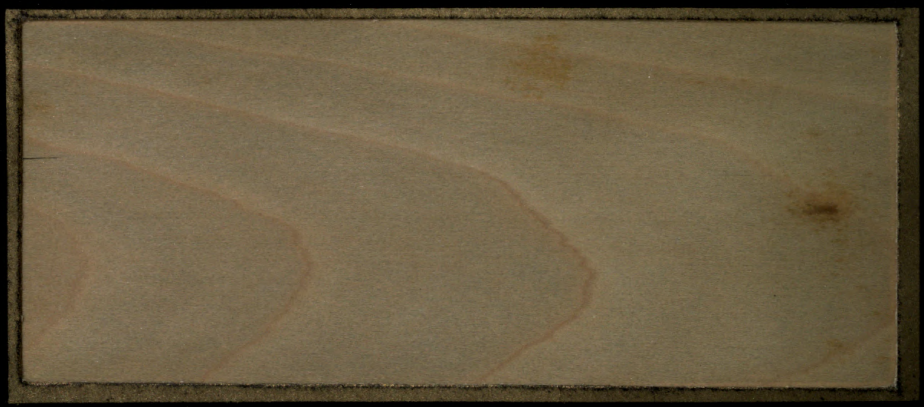
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

60. LIQUIDAMBAR STYRACIFLUA, L.

Sweet Gum, Bilsted, Red Gum.

TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION

Ger. Storaxbaum. Sp. Liquidambar.

Fr. Copalm.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

61. DIOSPYROS VIRGINIANA, L.

Persimmon, Date-plum.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Virginische Dattelpflaume. Sp. Persimon.

Fr. Plaqueminier de Virginie.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

61. DIOSPYROS VIRGINIANA, L.

Persimmon, Date-plum.

TRANSVERSE SECTION

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Virginische Dattelpflaume. Sp. Persimon.

Fr. Plaqueminier de Virginie.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

62. FRAXINUS SAMBUCIFOLIA, LAM.

Black Ash. Hoop Ash.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

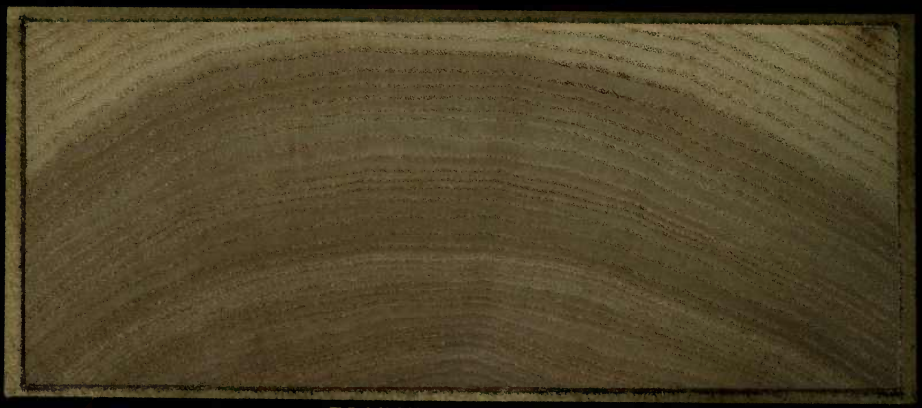
Ger. Schwarze Esche. Sp. Fresno negro.

Fr. Frêne noire.

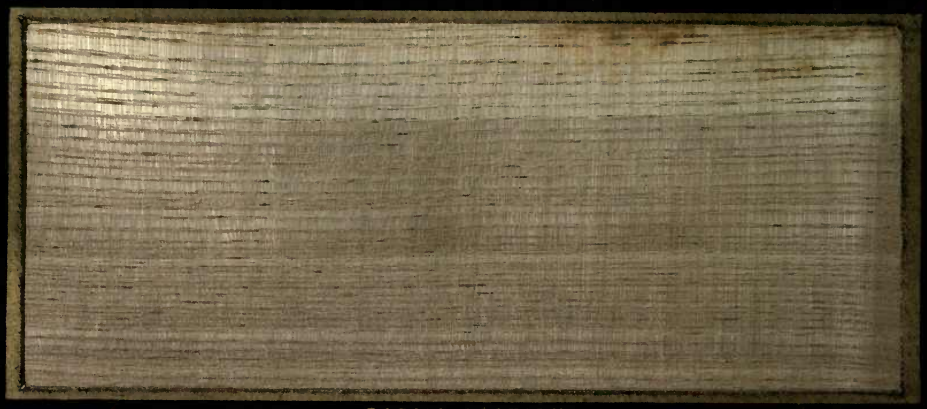
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

62. FRAXINUS SAMBUCIFOLIA, LAM.

Black Ash. Hoop Ash.



TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Schwarze Esche. *Sp.* Fresno negro.

Fr. Frêne noire.

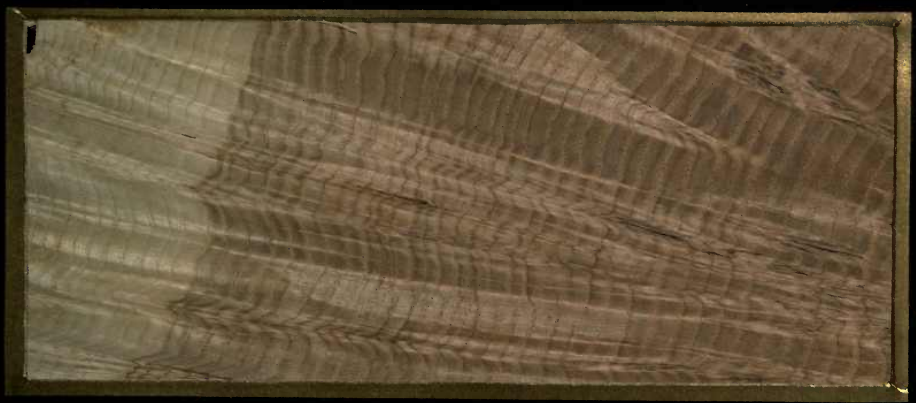
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

62a FRAXINUS SAMBUCIFOLIA.

Black Ash Burl.

TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Schwarze Esche Knoten. Sp. Fresno negro batanado nudoso.

Fr. Frêne noneux.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

62a FRAXINUS SAMBUCIFOLIA.

Black Ash Burl.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

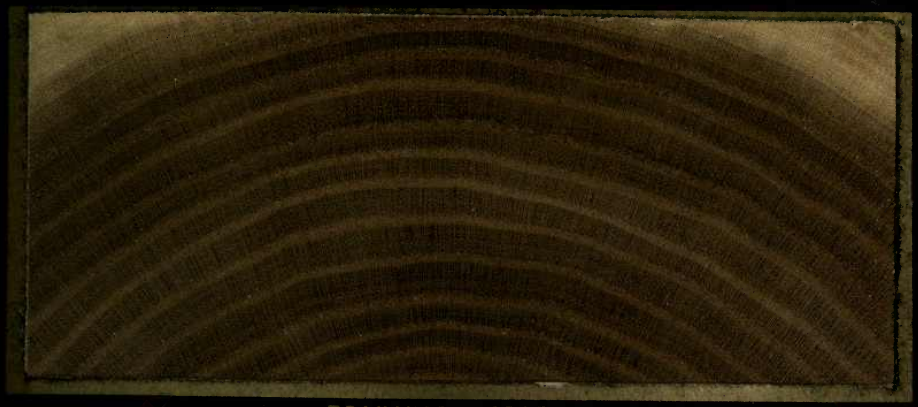
Ger. Schwarze Esche Knoten. Sp. Fresno negro batanado nudoso.

Fr. Frêne noueux.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

63. MORUS RUBRA, L.

Red Mulberry.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

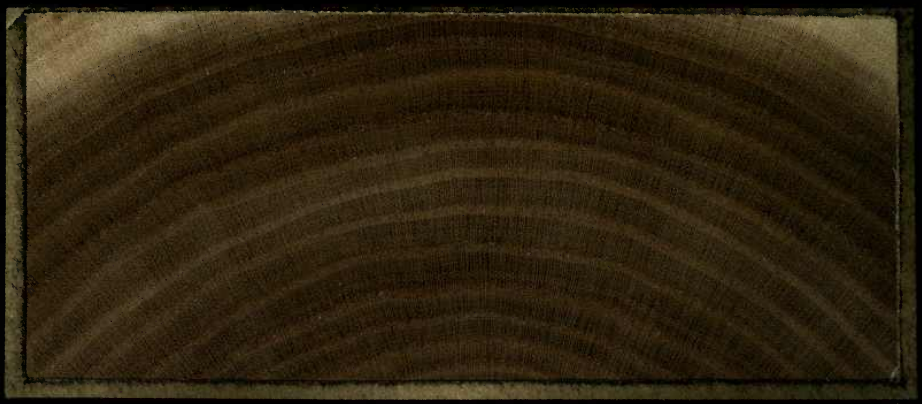
Ger. Rother Maulbeerbaum. Sp. Moral colorado.

Fr. Murier rouge.

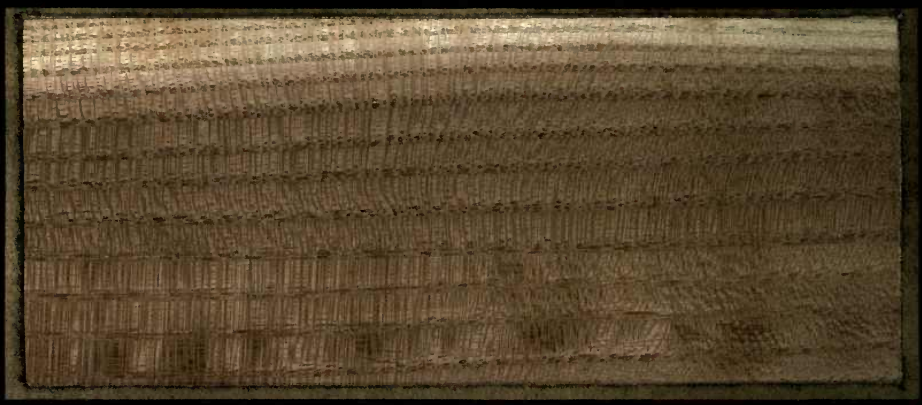
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

63. MORUS RUBRA, L.

Red Mulberry.



TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

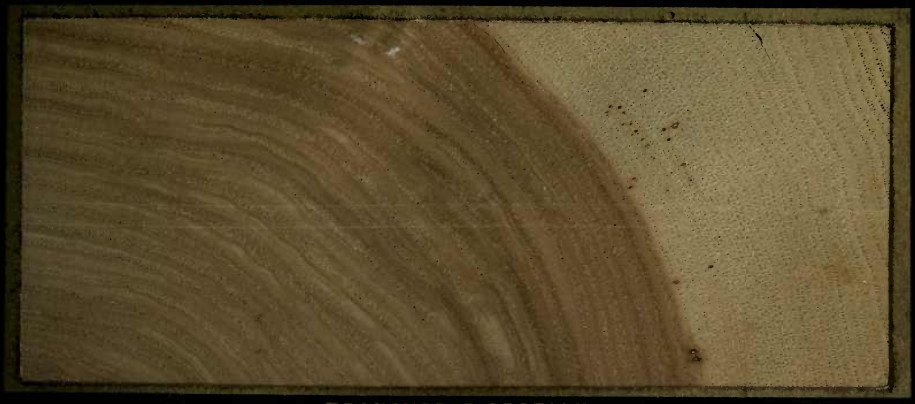
Ger. Rother Maulbeerbaum. *Sp.* Moral colorado.

Fr. Murier rouge.

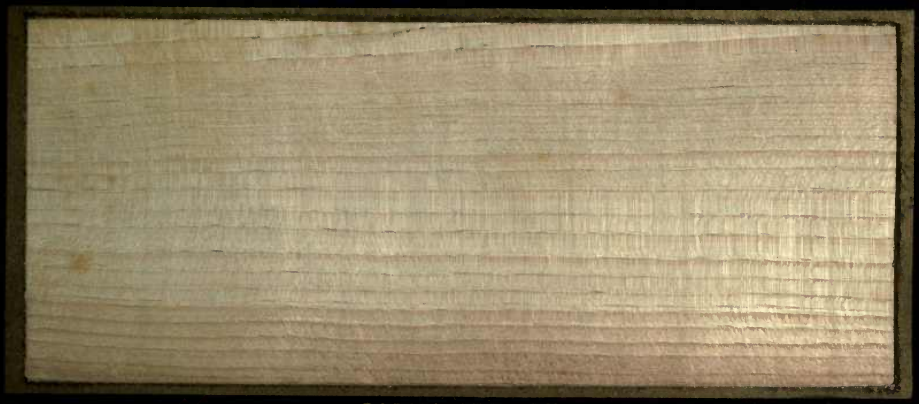
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

64. CARYA SULCATA, NUTT.

Thick Shell-bark Hickory, Big Shell-bark, King-nut.



TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

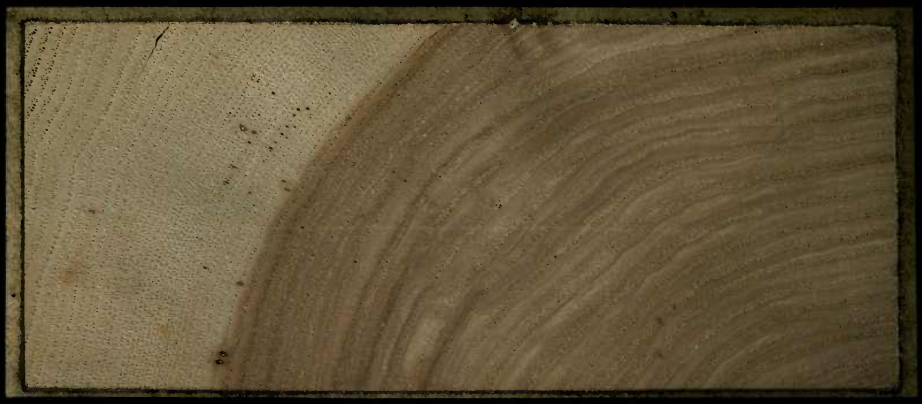
Ger. Gefurchte Hickory. Sp. Nogal surcado.

Fr. Noyer grand d'Amerique.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

64. CARYA SULCATA, NUTT.

Thick Shell-bark Hickory, Big Shell-bark, King-nut.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

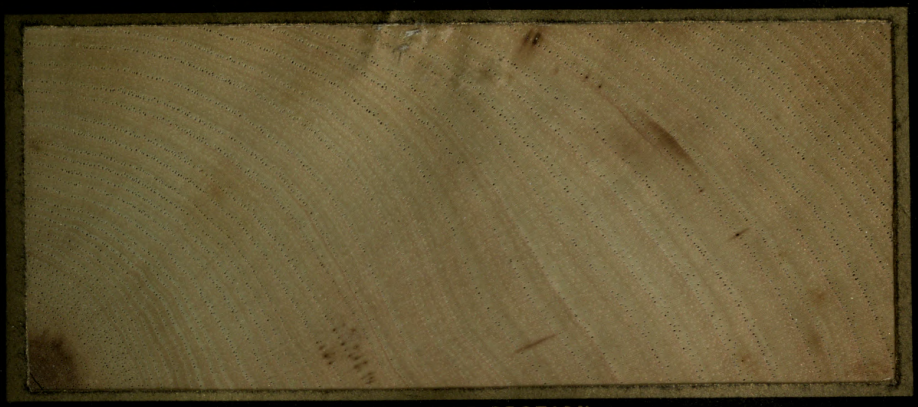
Ger. Gefurchte Hickory. Sp. Nogal surcado.

Fr. Noyer grand d'Amerique.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

65. CARYA PORCINA, NUTT.

Pig-nut Hickory. Brown Hickory, Black Hickory.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

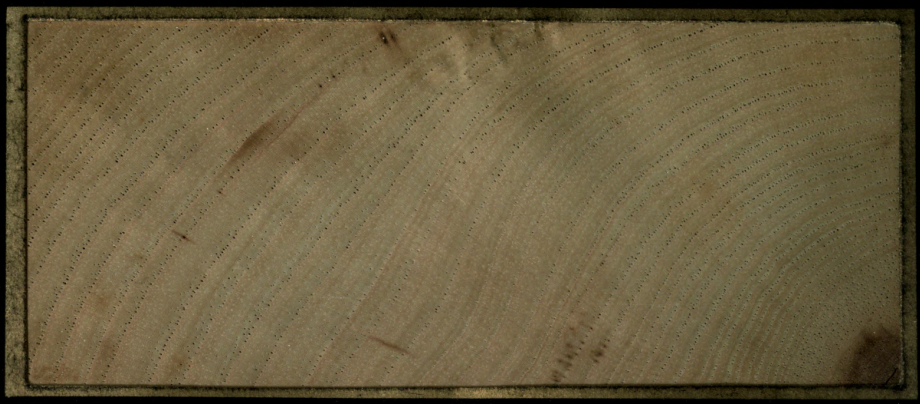
Ger. Ferkelnusz. Sp. Nogal de puercos.

Fr. Noyer de cochon.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

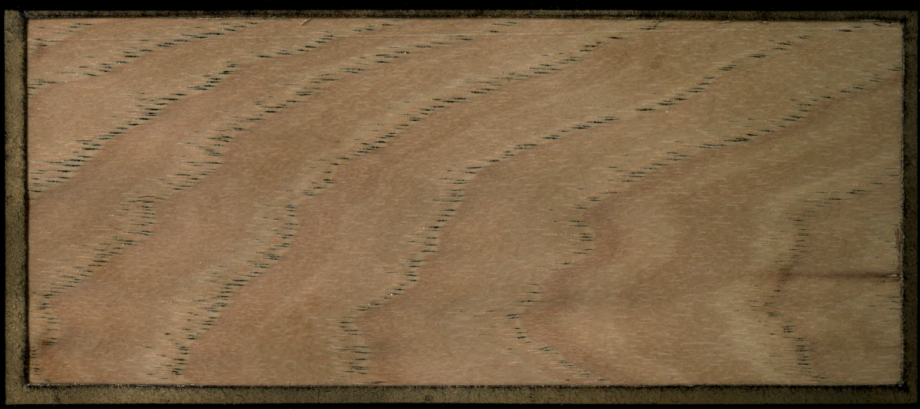
65. CARYA PORCINA, NUTT.

Pig-nut Hickory, Brown Hickory, Black Hickory.



TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION

Ger. Ferkelnusz. Sp. Nogal de puercos.

Fr. Noyer de cochon.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

66. QUERCUS BICOLOR, WILLD.

Swamp White Oak.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Zweifarbige Eiche. Sp. Roble blanco de pantano.

Fr. Chêne de Marais.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

66. QUERCUS BICOLOR, WILLD.

Swamp White Oak.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

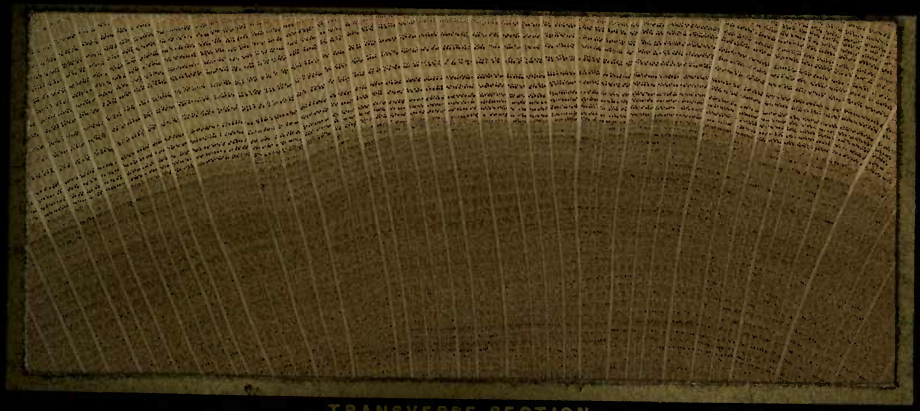
Ger. Zweifarbige Eiche. Sp. Roble blanco de pantano.

Fr. Chêne de Marais.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

67. QUERCUS PRINUS, L.

Rock Oak, Chestnut Oak.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION.

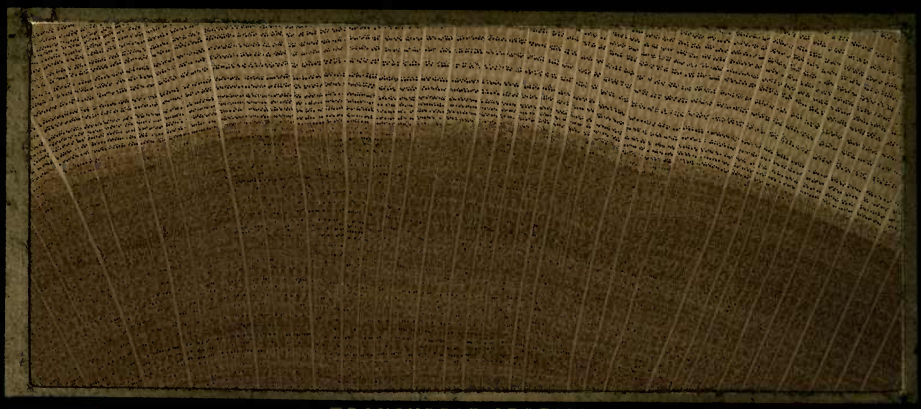
Ger. Felsen-Eiche. Sp. Roble de las rocas.

Fr. Chêne de roche.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

67. QUERCUS PRINUS, L.

Rock Oak, Chestnut Oak.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

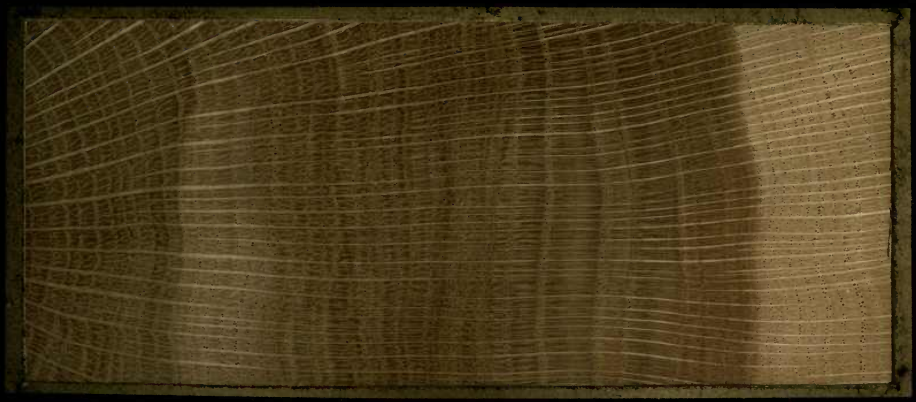
Ger. Felsen-Eiche. Sp. Roble de las rocas.

Fr. Chêne de roche.

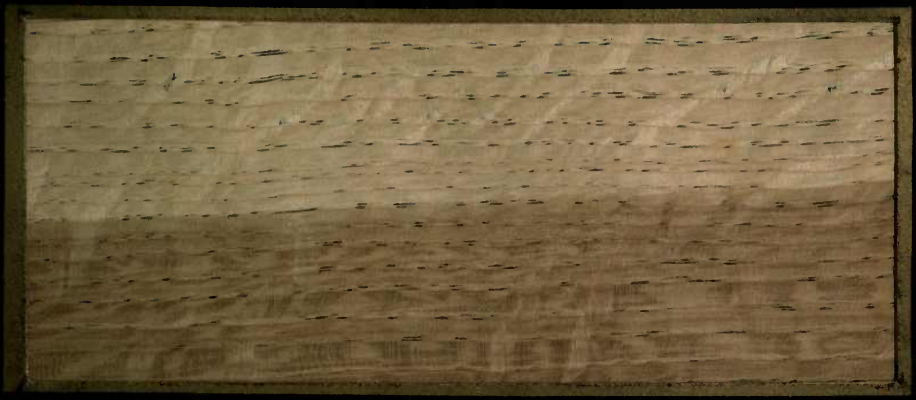
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

68. QUERCUS MUHLENBERGII, ENGELM.

Chinquapin Oak, Chestnut Oak, Yellow Oak.



TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Kostanien-Eiche. Sp. Roble amarillo.

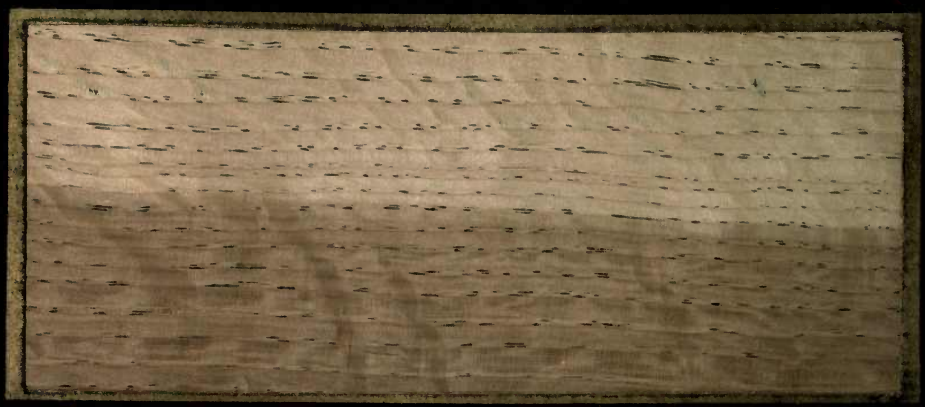
Fr. Chêne jaune.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

68. QUERCUS MUHLENBERGII, ENGELM.

Chinquapin Oak, Chestnut Oak, Yellow Oak.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Kostanien-Eiche. Sp. Roble amarillo.

Fr. Chêne jaune.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

69. QUERCUS COCCINEA, WANG.

Scarlet Oak.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Scharlach Eiche. Sp. Roble colorado.

Fr. Chêne écarlate.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

69. QUERCUS COCCINEA, WANG.

Scarlet Oak.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

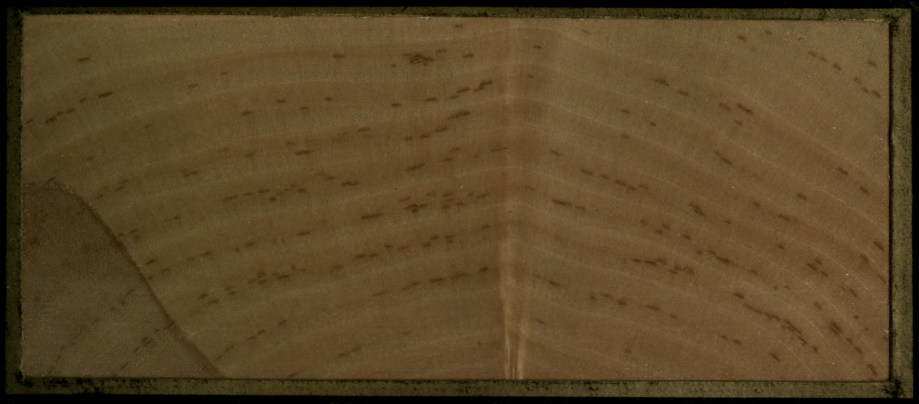
Ger. Scharlach Eiche. Sp. Roble colorado.

Fr. Chêne écarlate.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

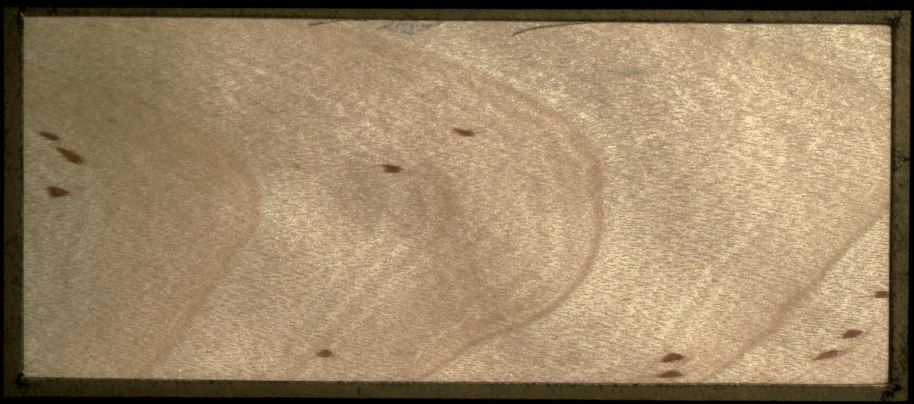
70. BETULA POPULIFOLIA, MARSHALL.

White Birch, Poplar-leaved Birch, Old-field Birch,



TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION

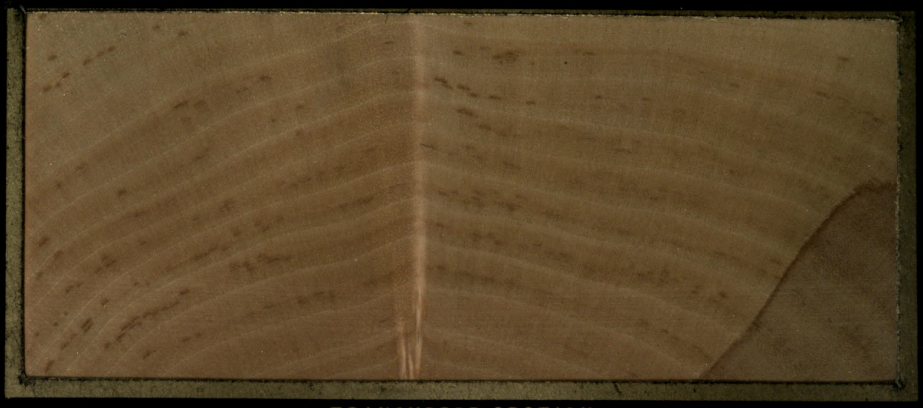
Ger. Pappelblättrige Birke Sp. Abedul blanco.

Fr. Bouleau blanc.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

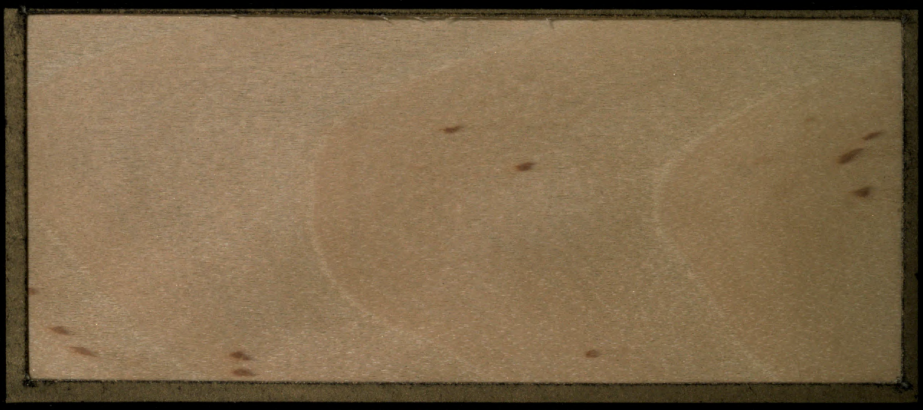
70. BETULA POPULIFOLIA, MARSHALL.

White Birch, Poplar-leaved Birch, Old-field Birch.



TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Pappelblättrige Birke Sp. Abedul blanco.

Fr. Bouleau blanc.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

71. SALIX AMYGDALOIDES, ANDERS.

Peach Willow, Peach-leaved Willow.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Mandel-Weide. Sp. Sauce de hojas de almendra.

Fr. Saule de Fuilles de peche.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

71. SALIX AMYGDALOIDES, ANDERS.

Peach Willow, Peach-leaved Willow.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

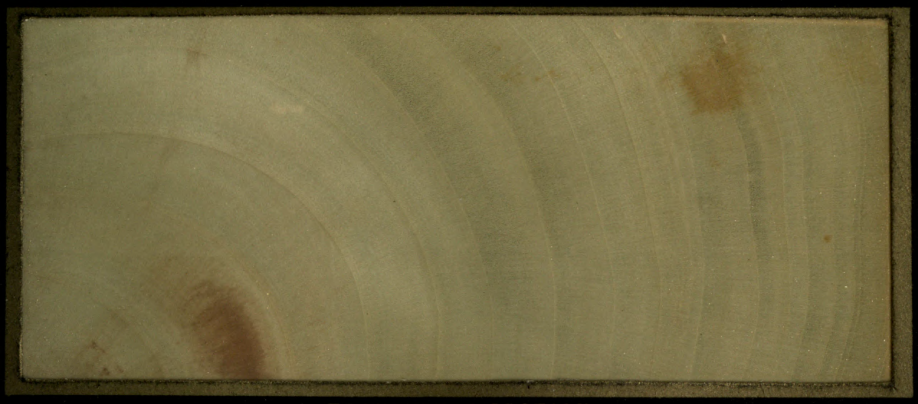
Ger. Mandel-Weide. Sp. Sauce de hojas de almendro.

Fr. Saule de Fuilles de peche.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

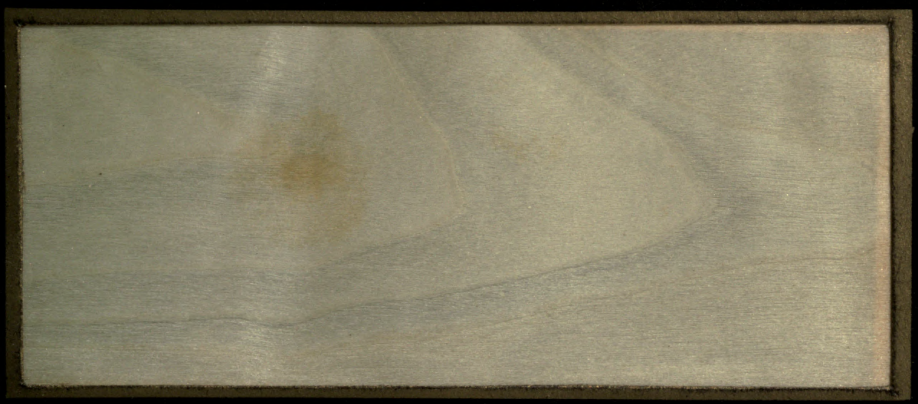
72. POPULUS TREMULOIDES, MICHX.

Quaking Asp, Aspen.



TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION

Ger. Amerikanische Zitter-espe. Sp. Alamo tremblon.

Fr. Le Tremble d'Amerique.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

72. POPULUS TREMULOIDES, MICHX.

Quaking Asp, Aspen.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Amerikanische Zitter-espe. Sp. Alamo tremblon.

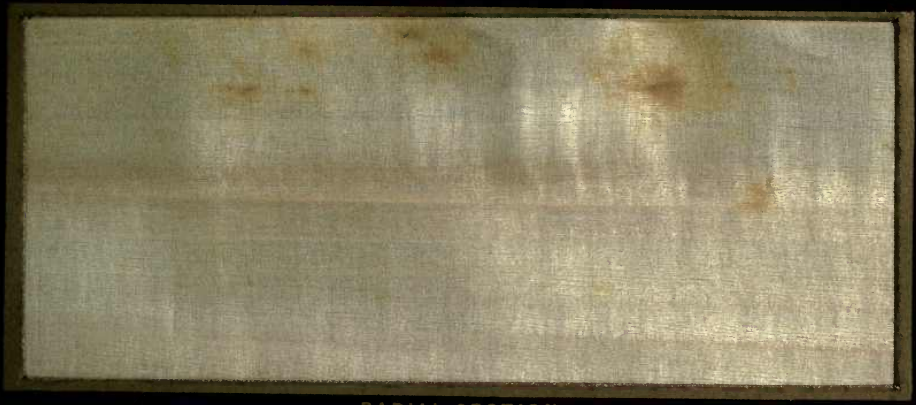
Fr. Le Tremble d'Amerique.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

73. POPULUS DILATATA, AIT.

Lombardy Poplar.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Pyramiden-Pappel. Sp. Alamo de Italia.

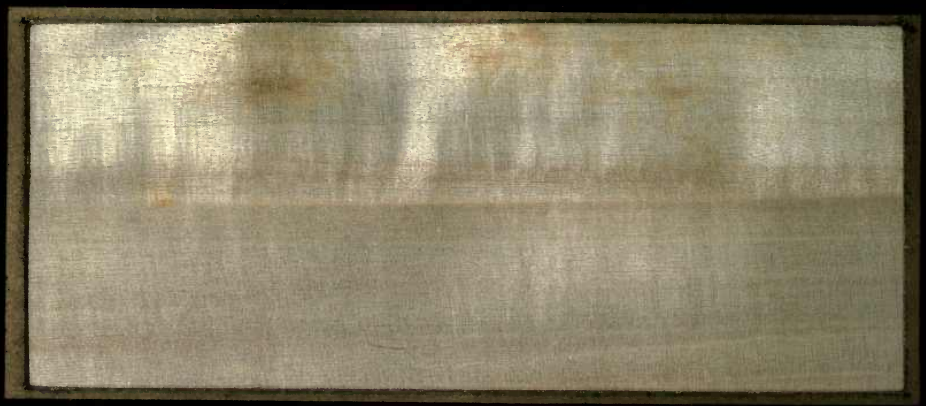
Fr. Peuplier pyramidal.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

73. POPULUS DILATATA. AIT.

Lombardy Poplar.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Pyramiden-Pappel. Sp. Alamo de Italia.

Fr. Peuplier pyramidal.

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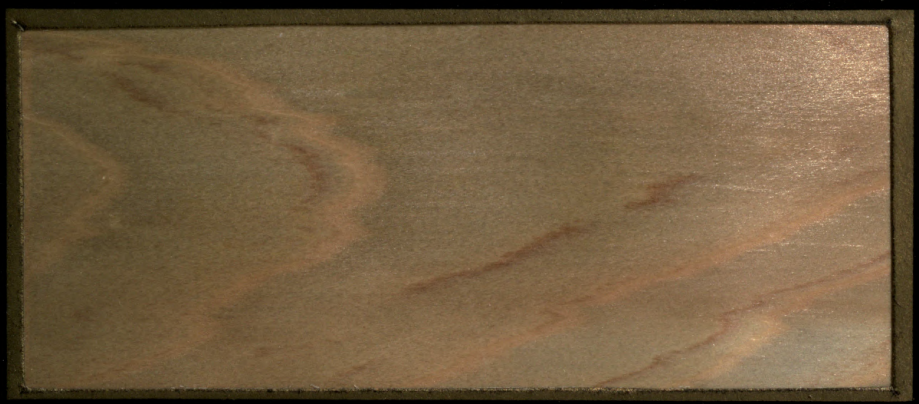
74 CHAMAECYPARIS THYOIDES, L.

White Cedar.

TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION

Ger. Weisze Zeder. Sp. Cedro blanco.

Fr. Cedre blanc.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

74 CHAMAECYPARIS THYOIDES, L.

White Cedar.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Weisze Zeder. Sp. Cedro blanco.

Fr. Cedre blanc.

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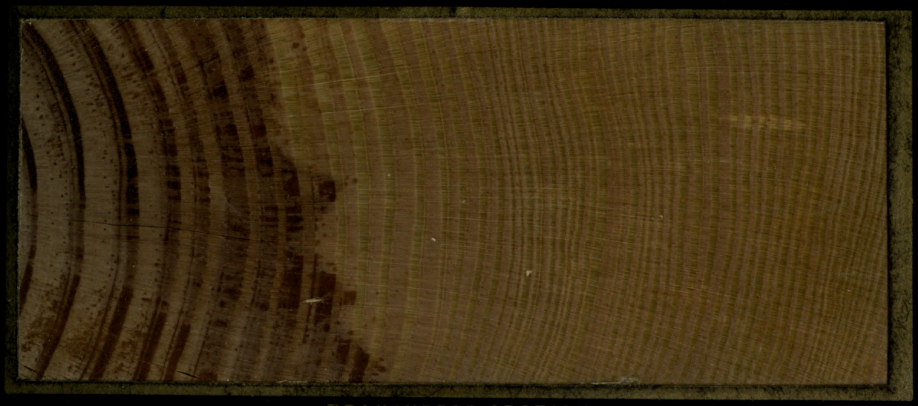
75 PINUS MITIS, MICHX.

Short-leaf Pine, Yellow Pine, Spruce Pine.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Kurznadelige Fichte. Sp. Pino con hojas certas.

Fr. Pin de feuilles courtes.

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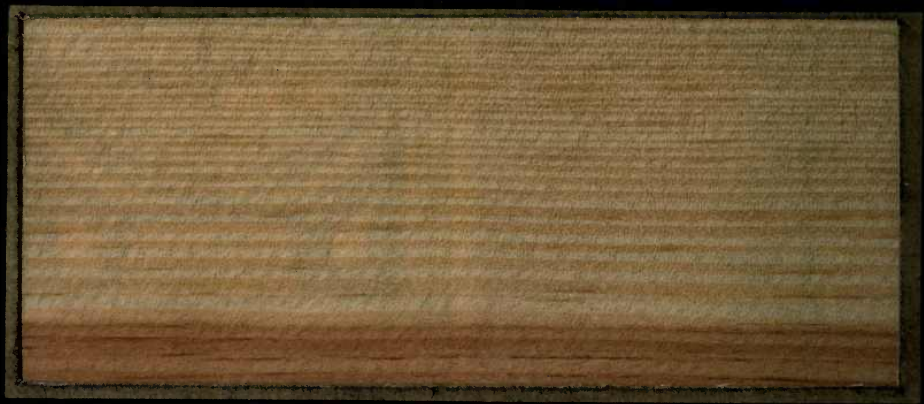
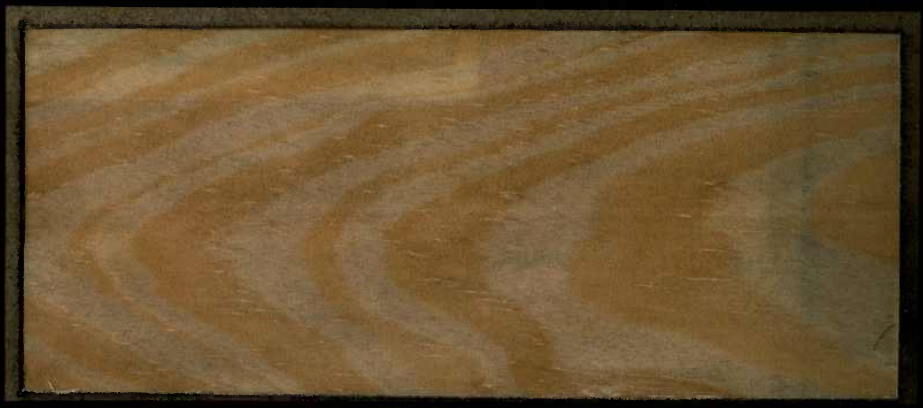
75 PINUS MITIS, MICHX.

Short-leaf Pine, Yellow Pine, Spruce Pine

TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Kurznadelige Fichte. Sp. Pino con hojas cortas.

Fr. Pin de feuilles courtes.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

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PLATES 51-75

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No. 9.	.10	No. 12.	.20	No. 15.	.40	No. A.	.25

N. B.—In using Water Colors for decorating these cards avoid having them too moist and with Oil Colors "cut" the oil by the admixture of a little turpentine. For perforating the cards, as for mounting on ribbon, etc., use a solid or "conductor's" punch; and when using with glue, as in pannel work, use "Isinglass" or fish glue and place it, not upon the card, but upon the surface the card is to be glued to.